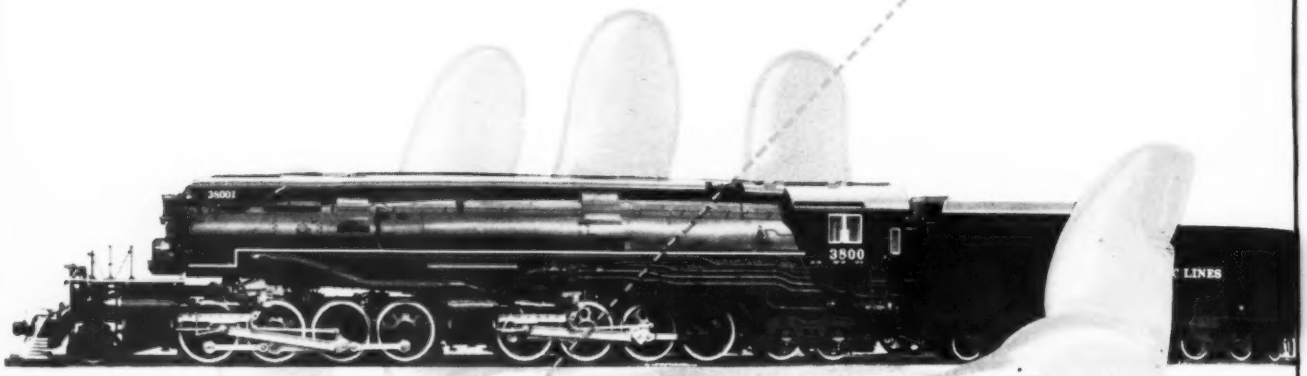
DECEMBER, 1946

Railway Engineering and Maintenance

Match for

345 TON GIANTS



MULTI-TON GIANTS like this 16-driver articulated job on the Southern Pacific haul heavier revenue loads.

. . . and place heavier responsibilities on right-of-way maintenance men.

Although new, heavier rail eases the maintenance burden, it can't solve the problem of joint deterioration due to strains imposed by heavier motive power and wheel loads and higher speeds.

But these monster power plants meet their match in Reliance Hy-Crome Pressure Springs. Made from fatigue-resisting steel of special analysis, developed by Reliance Research Engineers in cooperation with railroad men who know maintenance problems, Reliance Hy-Crome Pressure Springs have powerful, long-enduring reactive force which automatically compensates for looseness as a result of wear in rail bolts. Rail joints stay *tighter longer.*

For helpful hints on maintenance economy, write for a copy of the Reliance Hy-Crome family folder

Reliance **HY-CROME**

pressure springs

EATON

EATON MANUFACTURING COMPANY

RELIANCE DIVISION
MASSILLON, OHIO

Sales Offices: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montreal

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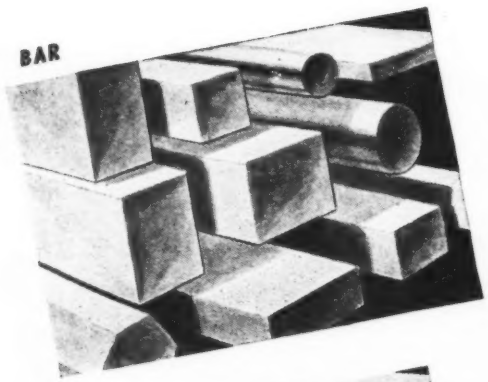

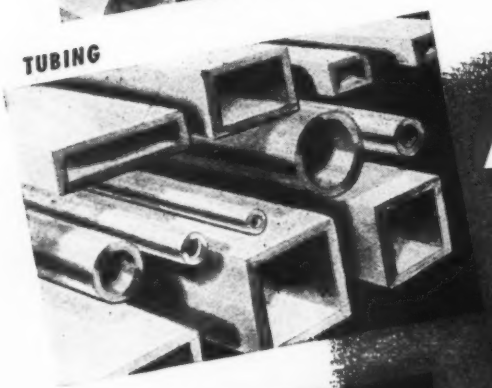

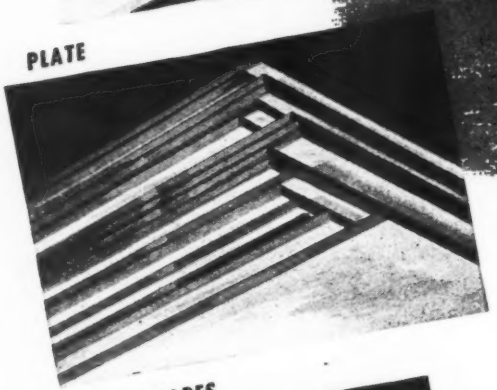

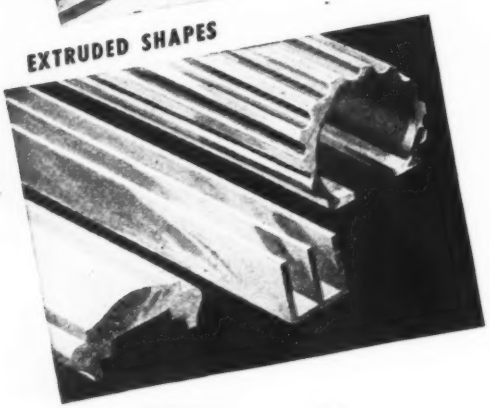

ALUMINUM MILL PRODUCTS

AVAILABLE TO FABRICATORS right now!

Consider your aluminum needs—then get in touch with your nearest War Assets Administration Regional Office to see if we can fill your requirements. Even your highly specialized requirements might be filled from WAA surplus stocks. It costs nothing to find out. Orders are filled quickly and without fuss.

All metals are sold under existing priority regulations. VETERANS OF WORLD WAR II are invited to be certified at the War Assets Administration Certifying Office serving their area, and then to purchase the materials offered herein.

Exporters are considered as wholesalers in the purchase of surplus property. Any question on export control should be referred to Office of International Trade, Department of Commerce, Washington, D. C.

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157-9

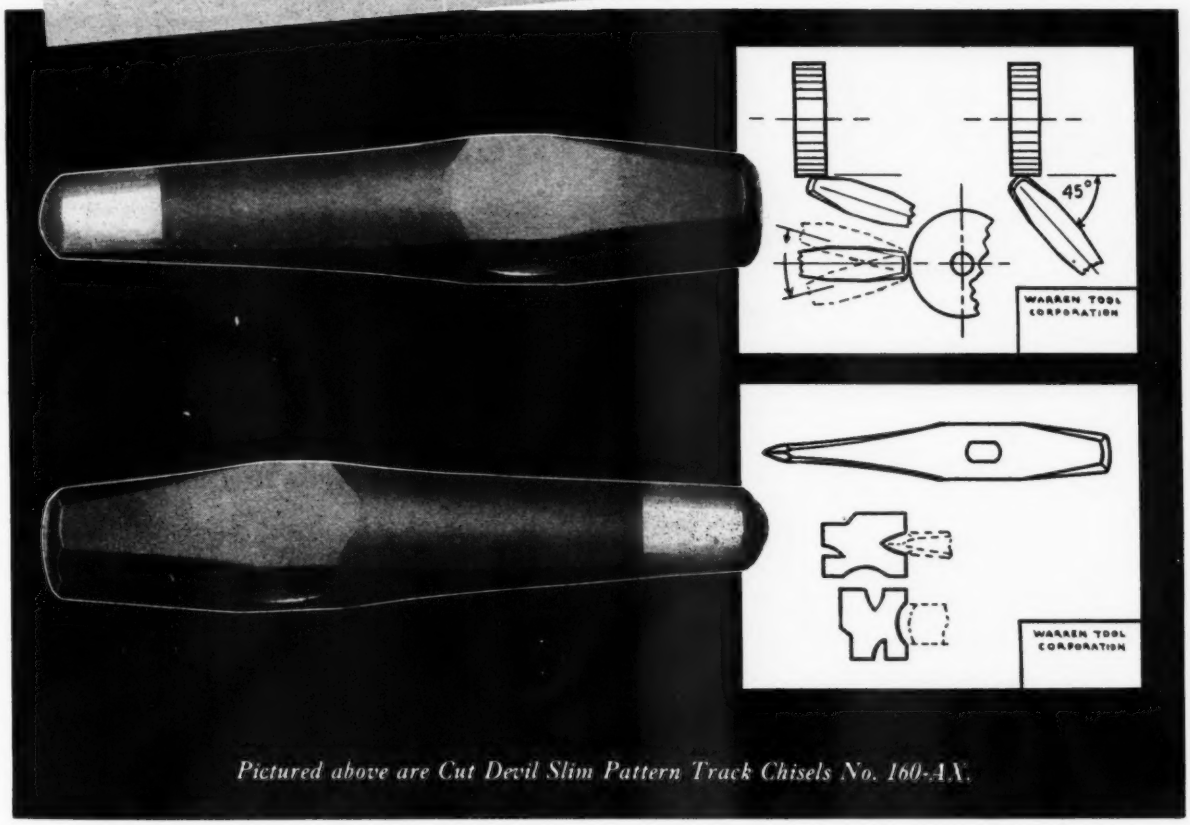
a requisition for

SAFETY...

is a requisition for

WARREN TOOLS

also . . . If you were to select a motto for the Devil Line of Warren tools, "Safety in Use" would be most appropriate. Warren backs up this motto with tool quality . . . furthermore, Warren will furnish you with Van Dyke prints for the proper care of tools—put copies of the prints on the walls where they will be seen and used. They promote "safety." Remember, too, "Service and Safety" is the basis for Warren production—all along the line from selection of electric furnace alloy tool steel to heat treating and grinding. *Write today for prints.*



Pictured above are Cut Devil Slim Pattern Track Chisels No. 160-AX.

DEVIL TOOLS

WARREN TOOL CORP. • WARREN, OHIO

GENERAL SALES OFFICES
105 W. Adams St., Chicago

***FACTORY:* GRISWOLD ST.**
WARREN, OHIO

CLAY PIPE PROVIDES *Safety factor* IN RAILROAD PROJECTS

Far-Sighted Engineers of new railroad projects, from roadbeds to spacious, new terminals, *play safe* when they specify Clay Pipe, because they can depend on it to safely carry any waste. The use of Clay Pipe is *insurance* against expensive failures likely to be caused if corroded or decomposed sewer and drain lines must be dug up and replaced. Clay Pipe's hard, tough texture resists the attacks of acids, chemicals and all types of industrial wastes.

Just a Few of America's Leading Railroads, Which Have Recently Installed Clay Pipe:

Atchison, Topeka & Santa Fe R. R.
Burlington R. R. • Chesapeake & Ohio R. R.
Illinois-Central • Louisville & Nashville
New York Central R. R. • Northern Pacific R. R.
Pennsylvania R. R. • Southern Railway
Southern Pacific • St. Louis & San Francisco R. R.

For information about Clay Pipe, write to:

NATIONAL CLAY PIPE MANUFACTURERS, INC.

111 W. Washington St., Chicago 2, Ill.
522 First National Bank Bldg., Atlanta 3, Ga.
1105 Huntington Bank Bldg., Columbus 15, Ohio
571 Chamber of Commerce Bldg., Los Angeles 15, Calif.

C-1146-10

CLAY PIPE

CLAY PIPE NEVER WEARS OUT!

HERE Today

HERE'S a job that proceeds fast. Working from the car a Northwest easily handles this drainage problem between the tracks.

Here is an emphatic illustration of Northwest versatility—a versatility that no track type machine can equal.

Here today—there tomorrow!

Here your Northwest Crawler Crane loads itself under its own power on any standard flatcar, travels from car to car either over flats or through drop-end gondolas handling the jobs along the line.

Tomorrow it can be back in the toughest terrain on the line handling run-off ditches, building out shoulders, trimming bank, laying culvert—doing any job that calls for material handling and excavation. You can't do that with a track crane.

NORTHWEST ENGINEERING COMPANY
1713 Steger Building . 28 E. Jackson Boulevard . Chicago 4, Illinois

THERE Tomorrow

YOU CAN'T DO THIS WITH A TRACK CRANE

NORTHWEST

THE ALL PURPOSE RAILROAD MACHINE
SHOVEL • CRANE • DRAGLINE • PULLSHOVEL

Proved on the Nation's Leading Railways

The Clean, Accurate Threads* of Oliver TRACK BOLTS save maintenance dollars

Track bolts that assemble faster, hold tighter and last longer save money for you year after year. Oliver takes great care to see that these qualities are incorporated in all track bolts and other products for railroad track and structures. From the original inspection of raw materials, through every manufacturing step, to final check of the finished product, Oliver *makes sure* that you get the best that modern engineering and manufacturing skill can produce when you specify OLIVER. The clean, accurate threads of the Track Bolt are but an outward indication of the high quality of all Oliver Fasteners.

For greatest satisfaction, specify OLIVER!

WRITE for the catalog of Oliver Railroad products.

OLIVER
IRON AND STEEL
Corporation

SOUTH 10th and MURIEL STREETS · PITTSBURGH 3, PA.

Here the Adzing Machine with guide rollers raised is passing through a crossing.

Machine Adzed Tie Seats For

Better Quality of Work—Better Riding Track

The advantages of machine adzing have made this operation standard practice on all Class I roads. Wherever new rail is laid, you will invariably find Nordberg Adzing Machines on the job, preparing the tie seats—all level and in the same plane. The Adzing Machine offered today is a vast improvement over the earlier models. Simple adjustments are provided for any setting of the cutter head. This saves time, gets the job done sooner and does a better quality of work.

Many roads are now replacing older models requiring considerable maintenance, with this faster, more easily adjusted model. If your road still has any of the earlier machines in use, it will pay to investigate the advantages of the more improved machine.

A Complete Line of Track Maintenance Tools

ADZING MACHINE · SPIKE PULLER · TRACK WRENCH · SPIKE HAMMER
CRIBEX · RAIL GRINDERS · RAIL DRILL · POWER JACK · TRACK SHIFTER

NORDBERG MACHINERY

NORDBERG MFG. CO. MILWAUKEE WISCONSIN

Export Representative—WONHAM Inc.—44 Whitehall St., New York

"BUT WHAT'S YOUR LAST NAME?"

Our last name is *Koppers*. Many of you know our "children" by their "first names," but do you know their last name?

That is important to us, and it's important to you, too.

Many of you vouch for the extra service you get from Fast's Self-aligning Couplings or American Hammered Piston Rings, or White Tar insecticides or D-H-S-Bronze . . . and don't know that their last name is Koppers. If you know, you are probably disposed to put more than ordinary trust in other products made by Koppers.

Did you know that you can get a Koppers product for coating metal surfaces to prevent corrosion? A Koppers material that makes roofs last longer? Lumber that defies decay and termites? And many other products made with the same skill and originality and inventiveness as those?

So . . . look for this trade-mark which will soon be found on all Koppers products. Here it is.

K
KOPPERS

It is the mark of an organization which is engaged in many phases of engineering, construction, chemistry and coal carbonization . . . is in the forefront of new synthetic developments . . . is an important supplier to the pharmaceutical industry and to many other industries. For top value, look for this mark. Koppers Company, Inc., Koppers Building, Pittsburgh 19, Pennsylvania.

THE INDUSTRY THAT SERVES ALL INDUSTRY

For example... for the railroad field

Among the principal products Koppers provides for the railroad field are:

Pressure-treated ties, bridge timbers, piles, poles, culverts, car lumber, station platforms, retaining walls, water tanks, etc.

Locomotive Cylinder and Valve Packing.

Automotive Piston Rings.

Piston Rings for diesel engines, and for compressors, pumps, etc.

Coal tar pitch roofing and waterproofing.

Bituminous-base paints.

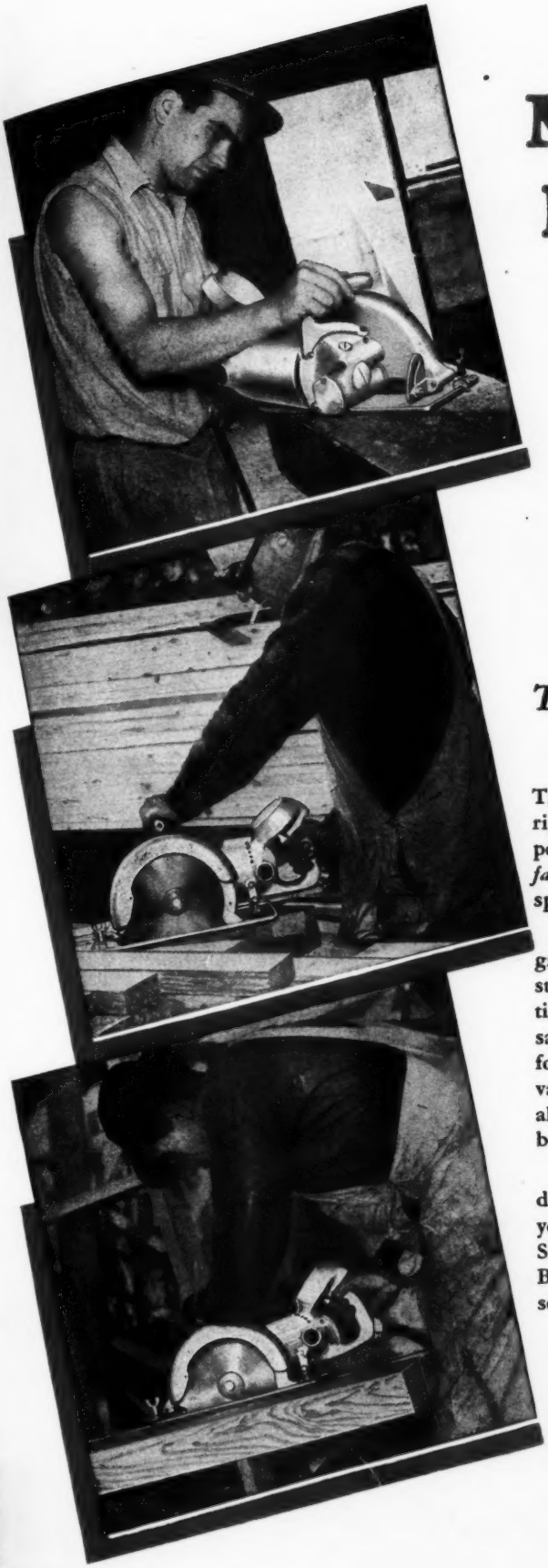
Plastipitch Protected Metal roofing and siding.

Pitchmastic Flooring Compound.

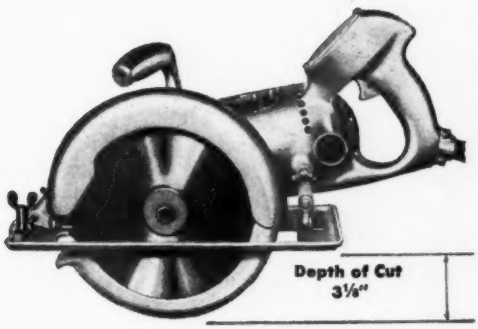
Coal handling equipment.

Fast's Self-aligning Couplings.

Pipe Dips.



Makes Extra-Deep Cuts FASTER!



This Husky 9-inch "Quick Saw" is Powered for Heavy-Duty Sawing*

There's nothing like a Black & Decker 9" Quick-Saw for ripping hours off heavy construction sawing jobs! This powerful saw cuts to a maximum depth of 3⅛"—*ten times faster than hand sawing.* And it's built to take the rough spots without slowing up or overheating.

With a Quick-Saw, you can rip, crosscut, angle, groove, dado—on studs, roof trusses, rafters, joists, stair stringers, all kinds of heavy structural lumber—even save time by stacking boards for sawing. What's more, the same saw can be equipped with blades and abrasive discs for cutting compoboard, slate, tile, marble, asbestos, galvanized sheet, other thin or non-ferrous metals. Yet, with all its power and ruggedness, the Quick-Saw is perfectly balanced for easy handling.

Ask your nearby Black & Decker Distributor for full details on timesaving Quick-Saws. And write today for your free copies of our illustrated, informative "Electric Saw Handbook" and complete catalog. Address: The Black & Decker Mfg. Co., 663 Pennsylvania Ave., Towson 4, Maryland.

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker

PORTABLE ELECTRIC **TOOLS**

*Trade Mark Reg. U. S. Pat. Off.

SEE FAIRBANKS-MORSE FIRST FOR MOTOR CARS

What are your primary motor car requirements? Power? Safety? Portability?

If the features you want built into a motor car are stamina, safety, and light weight, then check with Fairbanks-Morse Motor Cars. You will agree they will give you the service you are looking for.

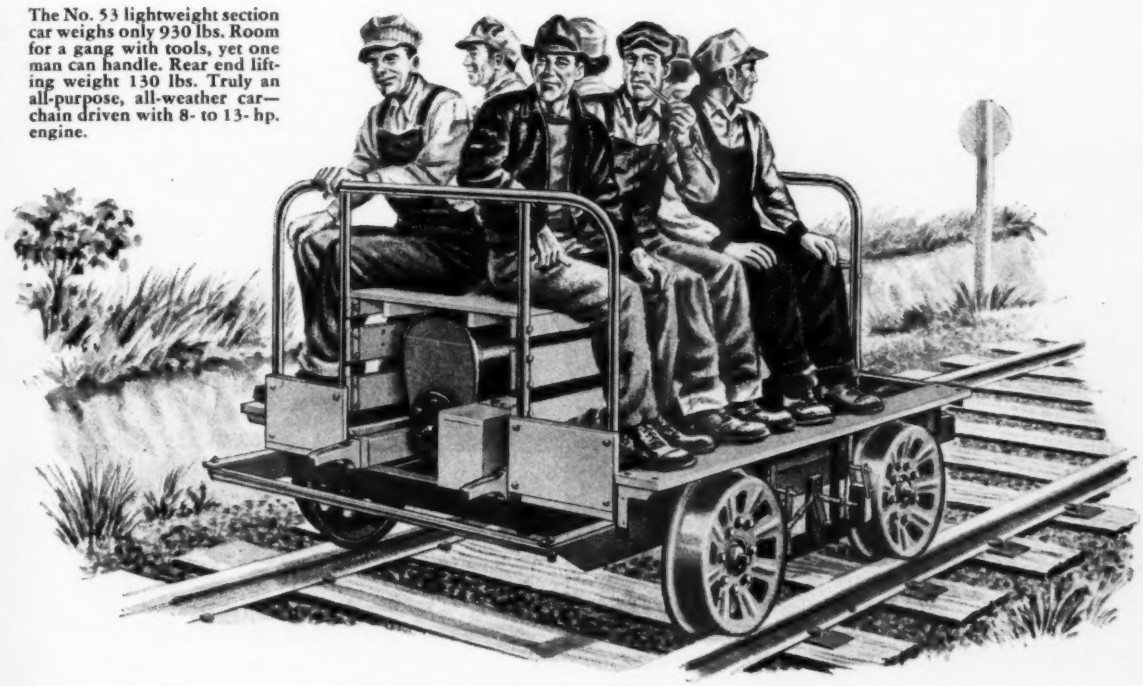
Here is needed power for grades and curves . . . rugged construction for maximum safety at straightaway speeds . . . light weight for easy handling.

Moreover, here are proved dependability and economy of operation that mean savings in maintenance time and dollars.

Signal maintainers, section or bridge gangs, track inspectors, roadmasters, etc., have used Fairbanks-Morse Motor Cars for over 50 years. Profit by their experience and make your motor car investment count . . . specify Fairbanks-Morse!

Fairbanks, Morse & Co., Fairbanks-Morse Bldg., Chicago 5, Illinois.

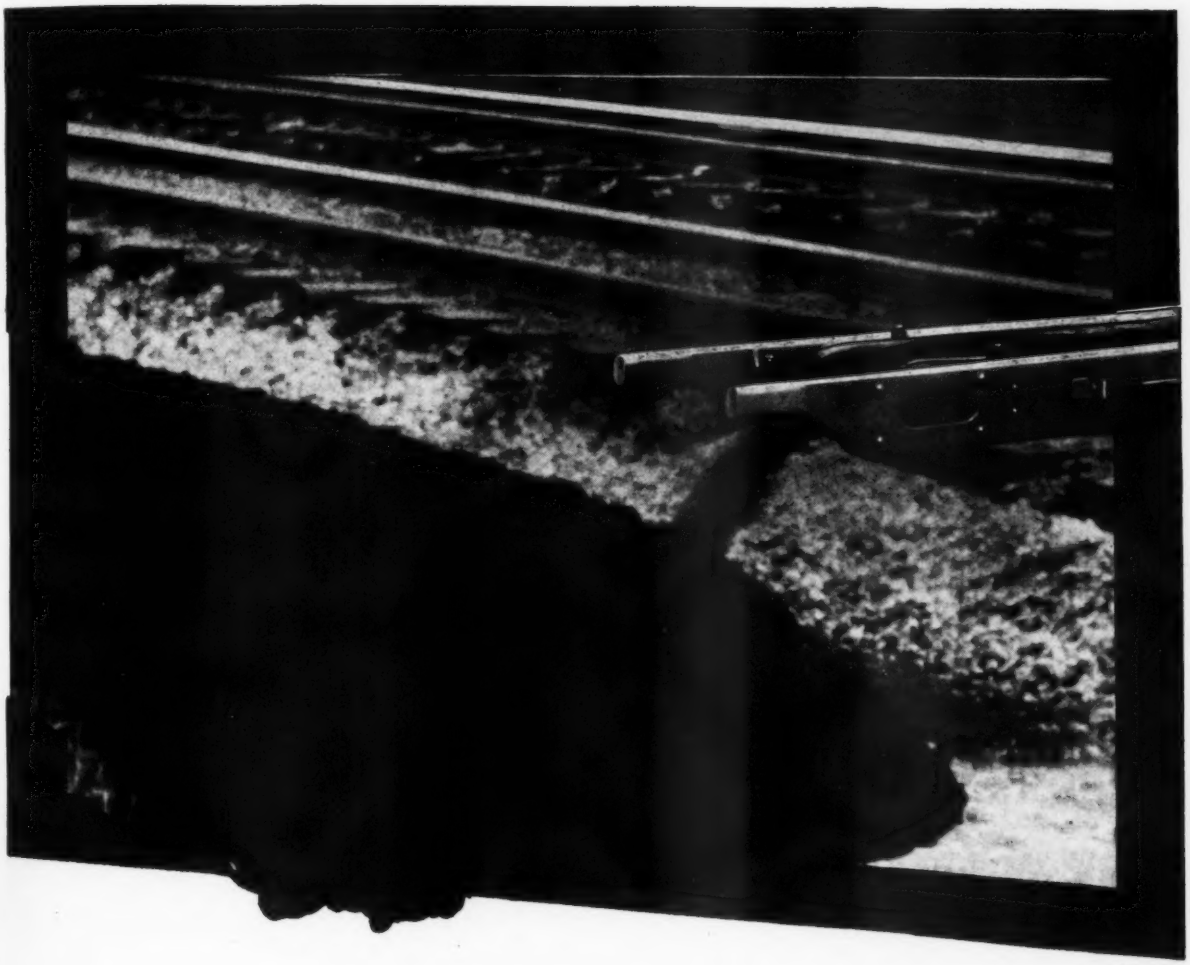
The No. 53 lightweight section car weighs only 930 lbs. Room for a gang with tools, yet one man can handle. Rear end lifting weight 130 lbs. Truly an all-purpose, all-weather car—chain driven with 8- to 13- hp. engine.



Fairbanks-Morse

A name worth remembering

Diesel Locomotives • Diesel Engines
Scales • Motors • Pumps • Generators
Magnetos • Stokers • Railroad Motor Cars and Standpipes • Farm Equipment



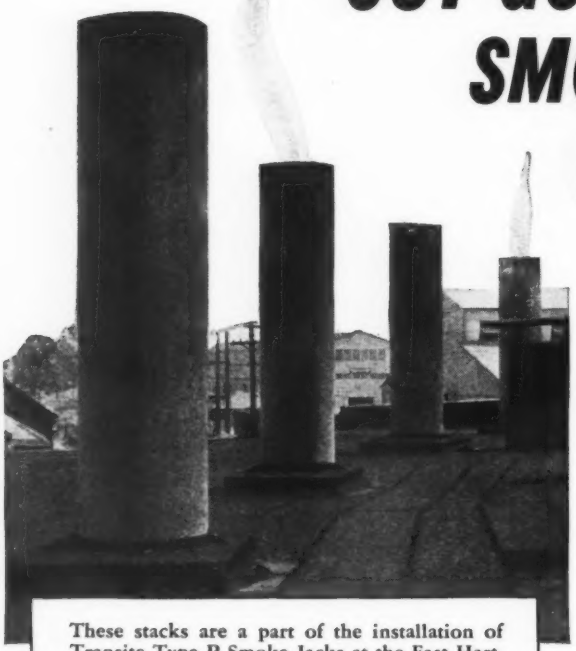
MOUNTAINS (OF DIRT) FROM A "MOLE"

The mountain range above is only two feet high but it represents the peak of roadbed maintenance efficiency. Just a flick of the switch starts the new model McWilliams "Mole" Ballast Cleaner through the ballast of your road, sifting out unwanted cinders and dirt as it moves forward 3 feet per minute.

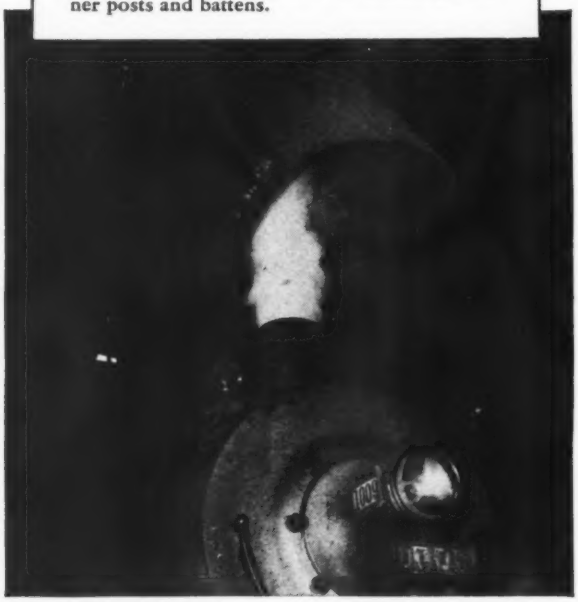
R M C

OUT GO SMOKE-VENTING PROBLEMS

with J-M Transite Smoke Jacks



These stacks are a part of the installation of Transite Type P Smoke Jacks at the East Hartford, Conn., roundhouse of the New York, New Haven and Hartford Railroad. Note the one-piece construction and absence of all fastenings, corner posts and battens.



Above: The hood of the Transite Type P Smoke Jack is so constructed that the corner pieces are quadrants of Transite Pipe joined lengthwise and at sides with flat Transite. This design affords maximum strength and economical erection.

There's no smoke-venting problem here—with J-M Transite Smoke Jacks to clear the air!

10 years ago Transite Type P Smoke Jacks were installed in the busy roundhouse of the New York, New Haven and Hartford Railroad at East Hartford, Conn. They are still in service today . . . carrying off smoke and fumes from locomotive stacks, keeping the roundhouse free of gases. No maintenance has been required.

The long useful life you can expect from Johns-Manville Transite Type P Smoke Jacks is due largely to two things—

FIRST, because they are made of asbestos and cement, they have unusual corrosion-resistance and durability.

SECOND, they are designed for roundhouse smoke disposal with a minimum number of parts, and a one-piece stack in which all fastenings, corner posts and battens are eliminated.

For complete information, write Johns-Manville at New York, Chicago, Cleveland, St. Louis, or San Francisco.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville

88 YEARS OF SERVICE TO TRANSPORTATION

Red Lead "PASSIVATES" METAL *Stifles Rust*

Proven performance through the years won for Red Lead its wide acceptance by industry as the standard paint for protecting metal.

But it remained for modern research to show the reasons *why* Red Lead is such an effective guardian against rust. One of the most important of these is Red Lead's ability to keep iron and steel in a "passive" state, in which rusting activity is reduced to a minimum.

As is well known, bare, unprotected steel exposed to moisture rapidly rusts.

However, the same steel protected by Red Lead remains in a "passivated" or rust-inhibited condition.

This non-corroding state of Red-Leaded steel, as compared with unprotected steel, can be measured electrically. See accompanying graph.

It is worth noting that, even after five years' exposure, the "passivating" power of Red Lead is still retained. No wonder, then, that Red Lead is considered the foremost paint for making metal *last.*

Specify RED LEAD for All Metal Protective Paints

The value of Red Lead as a rust preventive is most fully realized in a paint where it is the only pigment used. However, its rust-resistant properties are so pronounced that it also improves any multiple pigment paint. No matter what price you pay, you'll get a better metal paint if it contains Red Lead.

Write for New Booklet—"*Red Lead in Corrosion Resistant Paints*" is an up-to-date, authoritative guide for those responsible for specifying and formulating paint for structural iron and steel.

Scientific Proof of Red Lead's Protective Effect

In this test, a piece of unpainted steel was immersed in water. Iron, going into solution, reacted with oxygen in the water to form rust. This unrestrained corroding state is indicated by a rapidly developed and maintained negative potential relative to hydrogen (see above graph).

However, when steel panels painted with Red Lead were immersed under the same conditions, iron and lead salts formed directly next to the metal. This action at once stifled corrosion by preventing the iron from going into solution, thus keeping the steel surface passive. The result is shown in the graph curves above, where a quickly rising positive potential remains constant throughout the test.

It describes in detail the scientific reasons why Red Lead gives superior protection. It also includes typical specification formulas . . . ranging from Red Lead-Linseed Oil paints to Red Lead-Mixed Pigment-Varnish types. If you haven't received your copy, address nearest branch listed below.

* * *

The benefit of our extensive experience with Red Lead paints for both underwater and atmospheric use is available through our technical staff.

NATIONAL LEAD COMPANY: New York 6; Buffalo 3; Chicago 80; Cincinnati 3; Cleveland 13; St. Louis 1; San Francisco 10; Boston 6, (National Lead Co. of Mass.); Philadelphia 7, (John T. Lewis & Bros. Co.); Pittsburgh 30, (National Lead Co. of Pa.); Charleston 25, W. Va. (Evans Lead Division).

Dutch Boy *Reg. U. S. Pat. Off.*
Red Lead

B&O relocates 19.3 miles . . . contracts to move 3,700,000 yds.

M & T's Tournapulls load sandy clay, soft shale and gravel from borrow pit

(Above) Tournapulls spread fast . . . build fill in thin layers. (Below) Continual travel of big rubber tires helps compaction. Tournapull-built grades are stable, require very little final finishing

M & T Construction Corp.

has 1,460,000 yards to move in 11.8 miles on the west end of this spectacular B & O Railroad relocation. They started their high-speed Tournapulls in a borrow pit moving sandy clay, soft shale and gravel to build the new grade. Job will raise roadbed above water level of the proposed Dillon Dam. On 1500' haul, each Tournapull delivers 9 loads per hour . . . averages 1000 yards per 10-hour day. Morton S. Talbott, member of the firm, says "Tournapulls can't be beat . . . if you maintain a good haul road . . . you can't move dirt any faster. Give me Tournapulls for long or short hauls". These rubber-tired rigs were driven to this B & O project after grading 3 factory sites in Lexington, Kentucky — made the 220-mile trip in 19 hours.

LET FOR LOWEST NET COST PER YARD

Raises roadbed between Zanesville and Newark, O. above water level of Dillon Dam . . . all three contractors on the job use TOURNAPULLS

Swords-McDougal Co.

has 1,230,000 yards to move in a 2.3-mile section near Pleasant Valley, Ohio. Deepest cut is 126½' . . . highest fill 71' with 28' top. Their Tournapulls are giving a very good account of themselves. A comparative on-the-job production study of Tournapull vs. other high-speed, rubber-tired scraper equipment showed each Tournapull delivered 98 loads per day to 71 loads for the next best scraper unit. Haul was 2300', loading downhill, with 23% favorable grade on haul road.

Sutton Company, Inc.,

third contractor on this B & O relocation, has the center section — 5.2 miles, 1,010,000 yards. They're also using Tournapulls. Typical production in shale shows each rig is moving 500 yards per 8-hour day on 2200' haul.

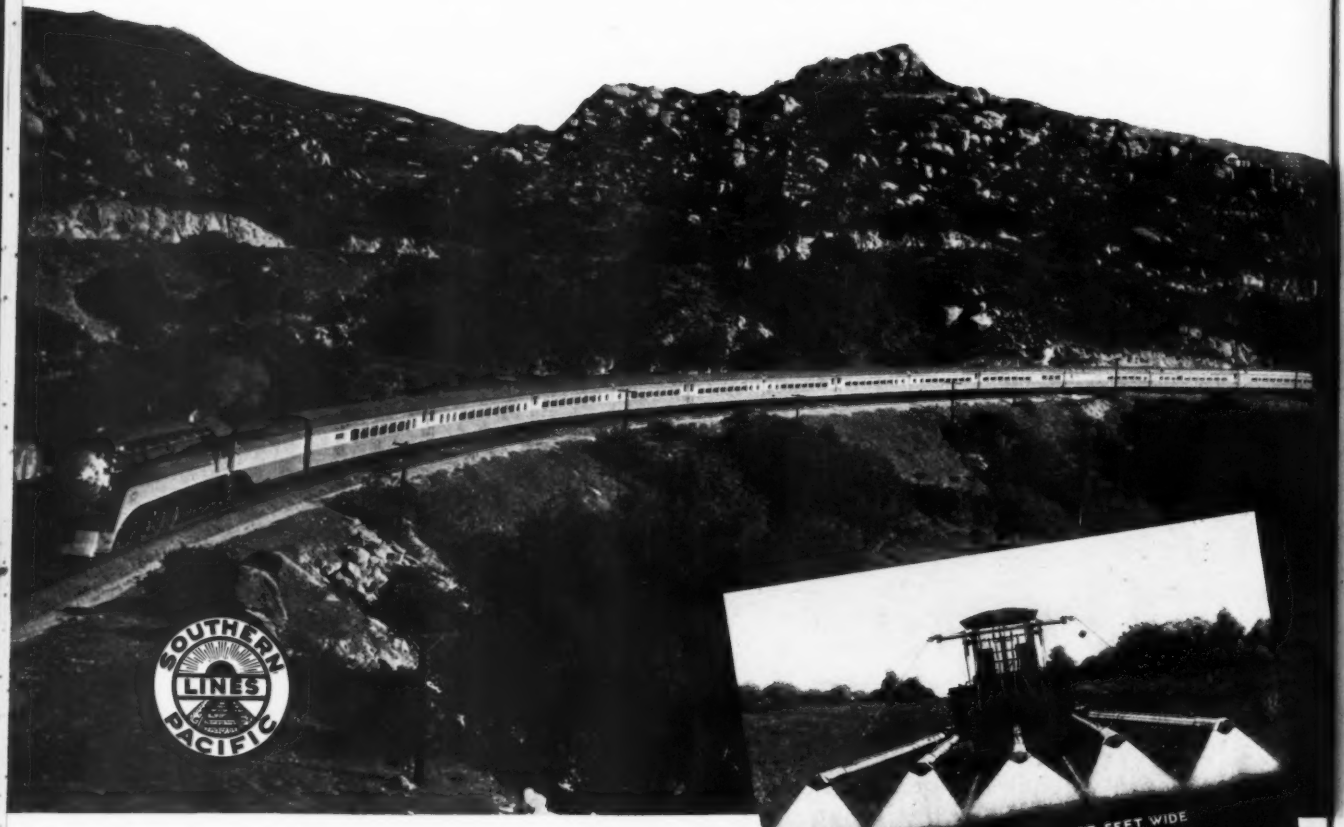
Along Swords-McDougal's section, deepest cut is 126½' . . . highest fill 71'.

Like these contractors, you will find off-track Tournapulls the answer on railroad construction, relocation and maintenance. See your LeTourneau Distributor for performance figures made by other big contractors on railroad jobs . . . check these with the engineers in charge. You'll find Tournapulls will move your dirt faster, with less manpower, for less money.

Tournapull — Trade Mark Reg. U. S. Pat. Off. RR13

LETOURNEAU PEORIA, ILLINOIS — JOB-PROVED Over 4650 Built and Shipped — **TOURNAPULLS**

modern maintenance machinery *is to* **modern track maintenance** *as* **modern train equipment** *is to* **modern railroad service**

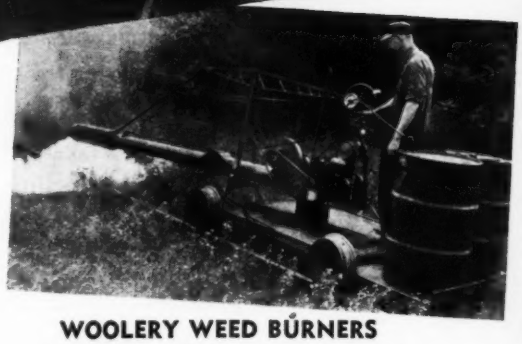


A SOLID WALL OF FLAME 25 FEET WIDE

The Southern Pacific's famous "DAYLIGHT" service between Los Angeles and San Francisco sets a new standard in luxury and travel convenience.

High speed roadbeds are carefully maintained by the engineering department for the operation of these fine modern streamlined trains in which railway maintenance equipment plays an important part.

Clean, weed-free track is an essential of sound roadbeds in facilitating good drainage, reducing tie decay, and insuring better ballast. In its program of weed elimination Southern Pacific, along with more than 75 other railroads, uses WOOLERY WEED BURNERS because of their dependability of performance, their economy of operation, and their proficiency in destroying vegetation with a minimum expenditure of time and manpower.



WOOLERY WEED BURNERS
Available in 5-burner, 3-burner, 2-burner, and 1-burner models.

Many railroads use their WOOLERY WEED BURNERS the year 'round —as snow melters in yards and terminals during the winter months.

WOOLERY MACHINE COMPANY

MINNEAPOLIS — Pioneer Manufacturers of — MINNESOTA

RAILWAY MAINTENANCE EQUIPMENT

RAILWAY WEED BURNERS · MOTOR CARS · T'E CUTTERS · TIE SCORING MACHINES · RAIL JOINT OILERS · CREOSOTE SPRAYERS · BOLT TIGHTENERS

EXCLUSIVE EXPORT REPRESENTATIVES: PRESSED STEEL CAR COMPANY, INC., PITTSBURGH, PENNA.

STANDARD ENGINEERS NOTEBOOK

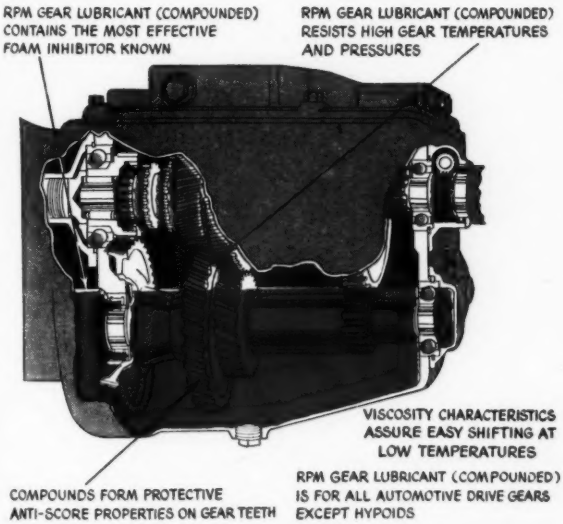
Compounded lubricant prevents gear scoring

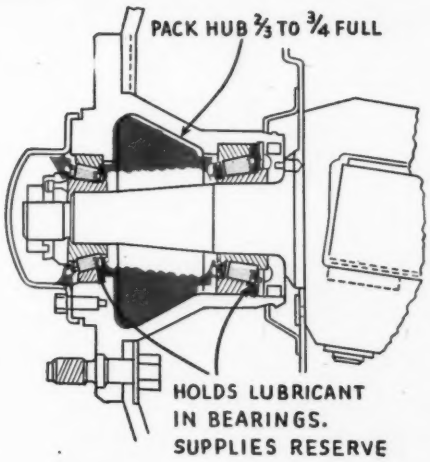
Many operators of automotive equipment have eliminated transmission and differential trouble by switching to RPM Gear Lubricant (Compounded). It is recommended for all transmissions and all conventional differentials. (RPM Hypoid Lubricant should be used in hypoid differentials.)

The compounds in RPM Gear Lubricant assure that a tough, oily film will remain on gears when pressure and heat become excessive. A highly effective foam inhibitor prevents retention of air in lubricant, poor distribution and "boiling up" to cause leaks.

RPM Gear Lubricant (Compounded) is non-corrosive. It comes in four grades: SAE 80, 90, 140, 250.

For complete information about automotive drive gears and their lubricants, write for the new, free booklet: "The Lubrication of Automotive Gears."





Wheel bearings last with heat-resistant grease

Because RPM Wheel Bearing Grease absorbs the countless shocks on wheel bearings, and stays put in extreme temperatures, it will prolong the life of properly adjusted wheel bearings.

RPM Wheel Bearing Grease is specially made for wheel bearings — both the roller type and the ball type. It will not throw out and melt unduly even in hot weather. In any weather it feeds in the proper amounts onto all parts of bearings providing a uniform, tough lubricant film. The resiliency of this film reduces vibration that might rack wheel bearings and steering gear assemblies.

Water resistant, RPM Wheel Bearing Grease helps bearing seals keep out moisture. It seals out grit and dust, too.

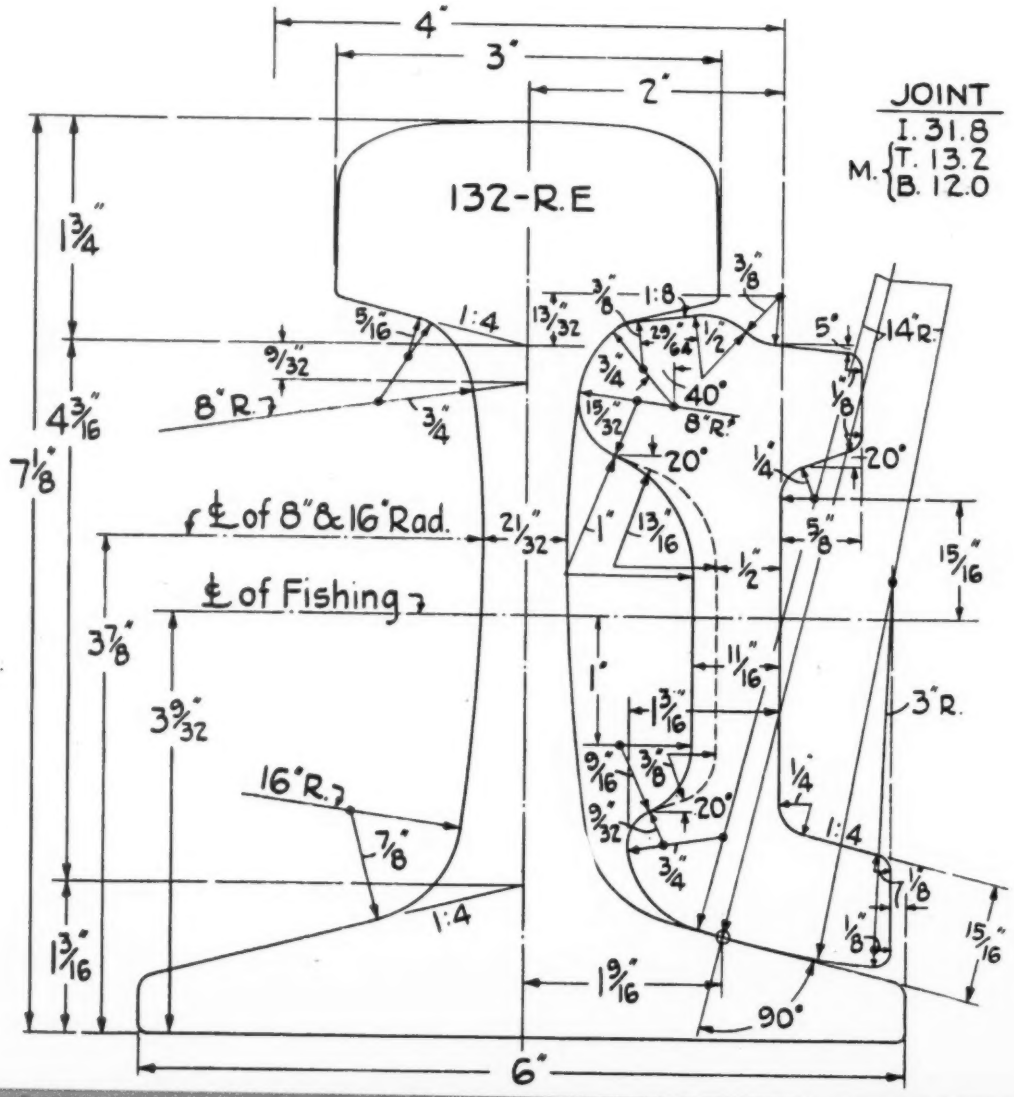
For complete information, write for the free booklets, "How To Service and Lubricate Wheel Bearings." There's one for heavy-duty trucks and trailers and one for light equipment.

For additional information and the name of your nearest Distributor, write Standard of California, 225 Bush Street, San Francisco 20, Calif.; The California Oil Company, 30 Rockefeller Plaza, New York 20, N. Y.; The California Company, 17th and Stout Streets, Denver 1, Colo.; Standard Oil Company of Texas, El Paso, Texas.

FOR EVERY NEED A STANDARD OF CALIFORNIA JOB-PROVED PRODUCT

New
MODERN RAILS

TEMPLET 132 K42



IMPROVED
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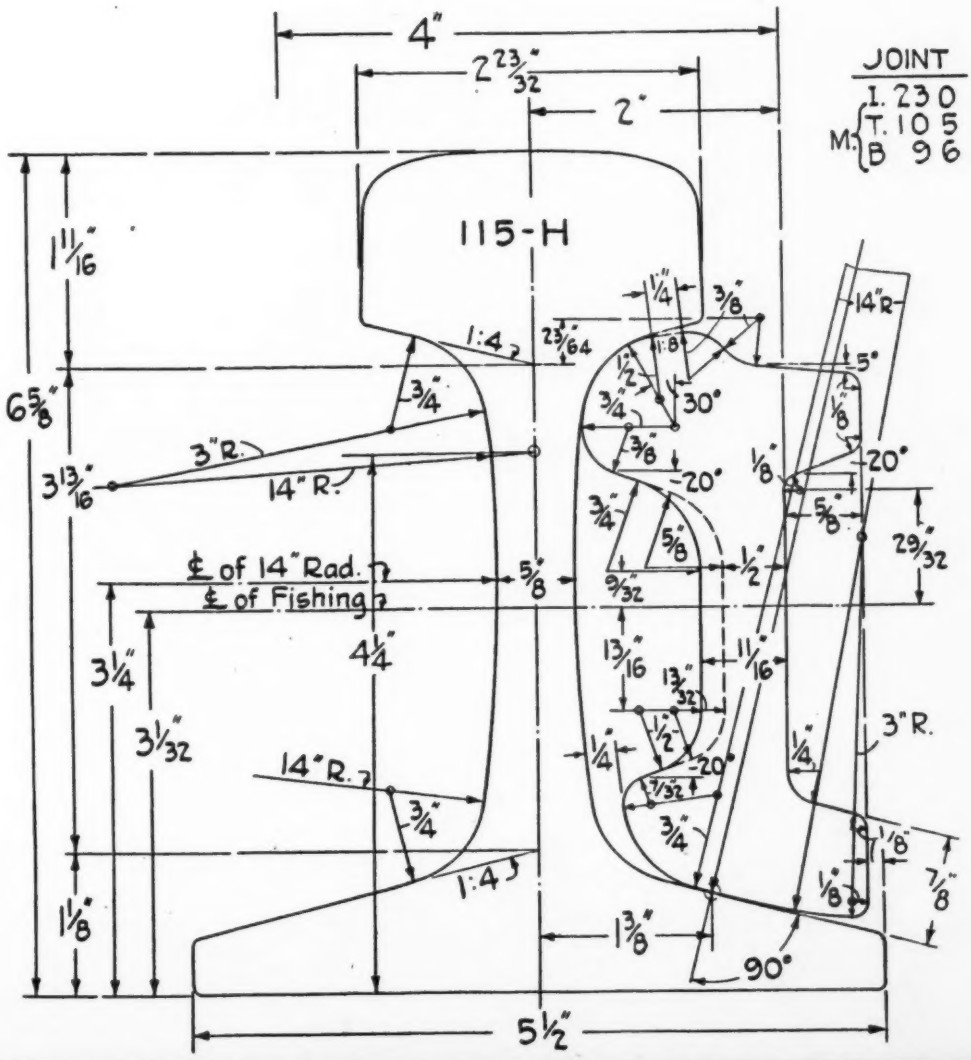
THE RAIL JOINT COMPANY, INC

Rails ARE STRONGER

TEMPLET 115K4



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EXTERIOR-TYPE plywood is made with completely waterproof synthetic resin binder especially for permanent exposure to weather and water. It is widely used for building exteriors, for outdoor signs, for railroad car siding, and in all phases of marine construction.

GENUINE -PLYSCORD- SHEATHING D. F. P. A. INSPECTED

PLYSCORD is an unsanded utility panel of unusual rigidity, made to withstand the rigorous service demanded of wall and roof sheathing and of sub-flooring.

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PLYWALL is the grade of interior-type plywood made for use where only one side is exposed, as in wall paneling. It is suitable for most stained finishes, for painting or papering.

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PLYFORM is the special concrete-form grade of Douglas fir plywood — a quality grade manufactured with highly water-resistant glues and intended for multiple re-use in form construction.

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Douglas Fir Plywood is Helping in the Construction of Houses for Veterans

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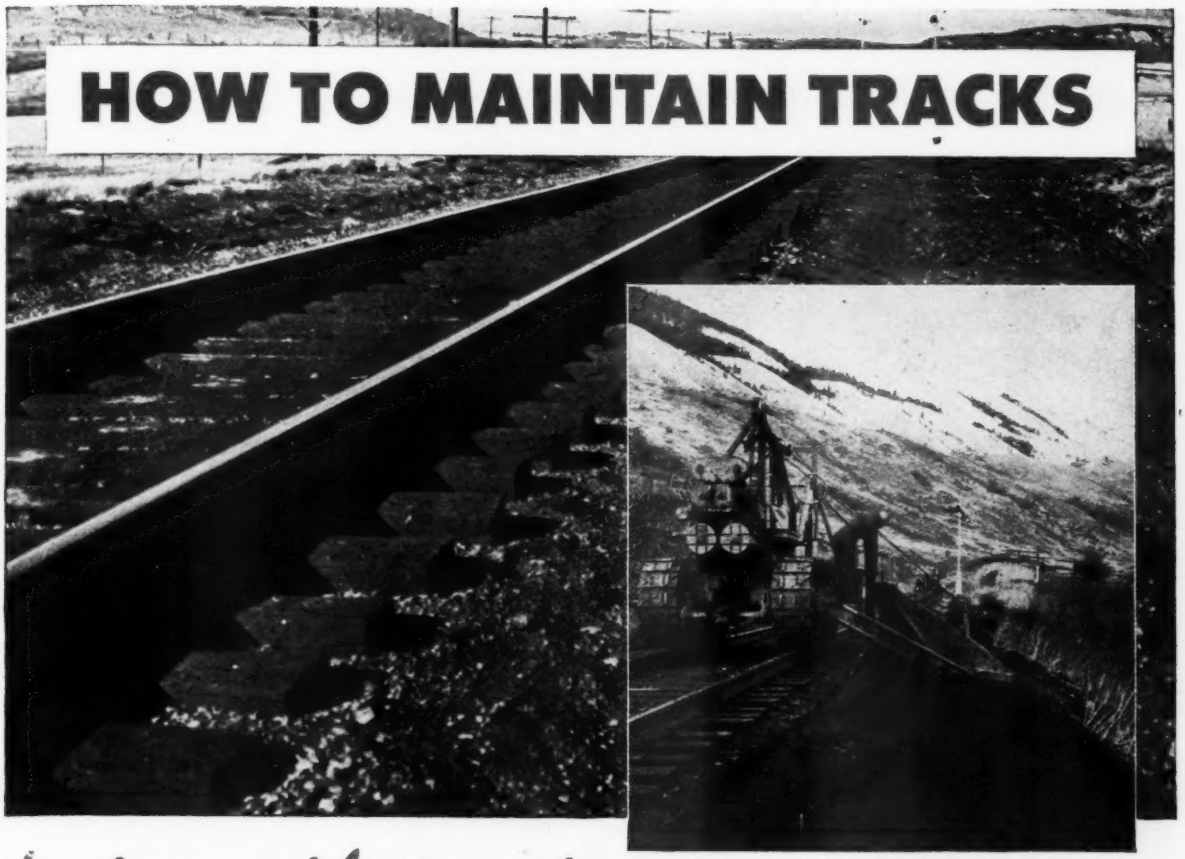
HOW TO MAINTAIN TRACKS



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faster...at less cost ...without holding up train schedules

ESCO track walking shoes and wingdozer is the answer.

Put them on a crawler-type tractor, and it replaces a locomotive on maintenance work—spreads ballast, skeletonizes and grades. A crew can do twice as much work with a track walking tractor and wingdozer as it can without this equipment.

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Detailed information on track-walking shoes and wingdozers is contained in *ESCO* booklet 153. A free copy is ready for you . . . Ask your nearest *ESCO* representative, or write us direct.

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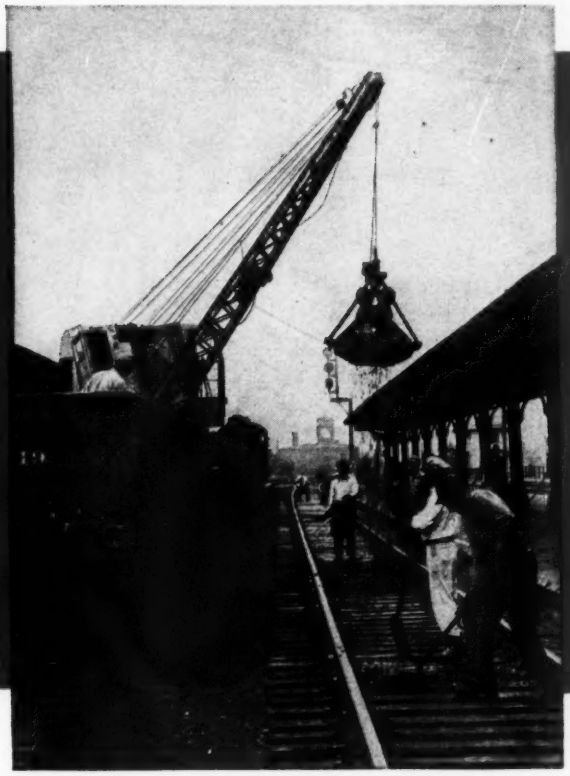

IMPROVES DRAINAGE, REDUCES MAINTENANCE

MORE and more railroads are interested in *Texaco Asphalt* to give stone ballast a flexible sealcoat that sheds water quickly, prevents fouling, keeps track in good line and surface indefinitely, and greatly reduces maintenance costs.

The *Texaco Asphalt* coating *stays flexible,* does not crack under traffic, and can be tamped even after long service. It is easy to apply and inexpensive — its cost quickly recovered in savings. *Texaco Asphalt* is ideal for ballasting track adjoining station platforms, at approaches to open floor bridges, under overhead structures, and similar locations where drainage is difficult.

For 40 years, *Texaco Asphalt* has been used in steadily increasing volume for the construction and maintenance of America's streets and highways. A similar steady increase in its use by American railroads is further evidence that *you can't buy a better asphalt!*

For details on how *Texaco Asphalt* can help you reduce track maintenance, call the nearest Railway Sales Division office listed below, or write The Texas Company, *Railway Sales Division,* 135 E. 42nd St., New York 17, N. Y.

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TEXACO Asphalt for Coating Ballast

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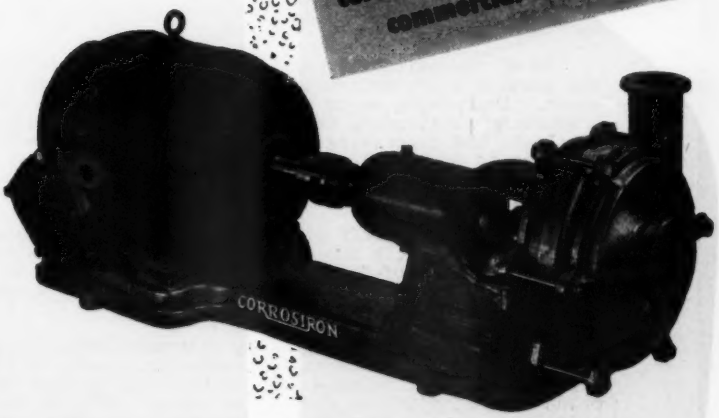
NEW BJ CORROSIRON ACID RESISTING PUMPS

CORROSIRON resists the corrosive action of more acids than any other commercial alloy.

CORROSIRON is more resistant to acid corrosion than any other commercial alloy.



CORROSION AND ABRASION RESISTANCE—Corrosiron is a high silicon iron. It is not only remarkably resistant to corrosion, but is also extremely abrasion resistant, having a hardness of 300 Brinnell. It is unexcelled for handling corrosive liquids carrying abrasive solids.

INGENIOUS ENGINEERING—The brittleness and low tensile strength characteristics of high silicon irons pose unusual problems in engineering a centrifugal pump. But special care and the ingenious application of many years of experience provide the solution. These new BJ Corrosiron Acid Pumps are engineered for years of heavy-duty, trouble-free operation.

WE INVITE INQUIRIES about the application of BJ Corrosiron Acid Pumps to the pumping of corrosive liquids.

Byron Jackson Co.

LOS ANGELES 54, CALIFORNIA

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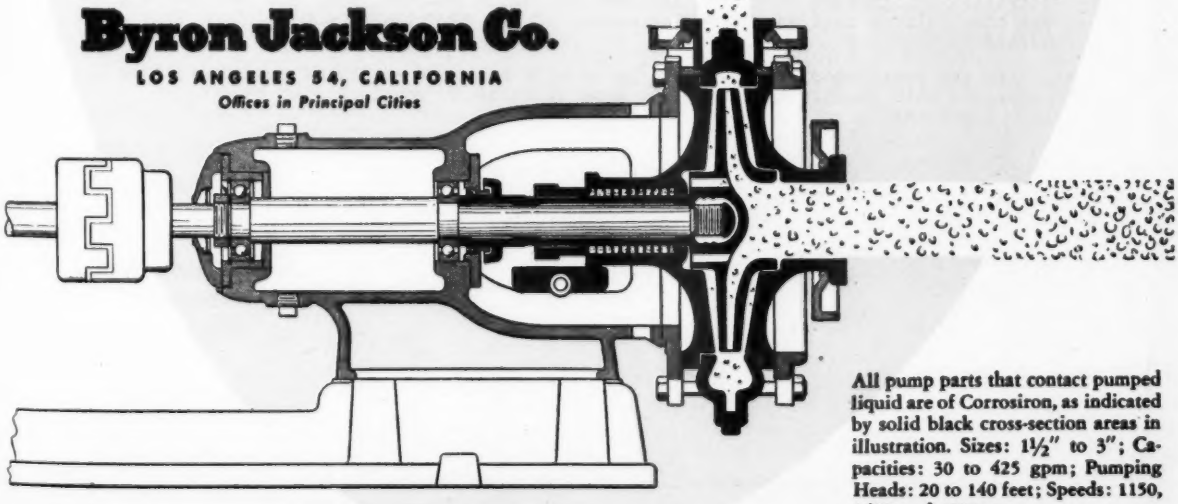

All pump parts that contact pumped liquid are of Corrosiron, as indicated by solid black cross-section areas in illustration. Sizes: 1½" to 3"; Capacities: 30 to 425 gpm; Pumping Heads: 20 to 140 feet; Speeds: 1150, 1450, and 1750 rpm.

No. 216 of a Series

Railway
Engineering and Maintenance
SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO, ILL.

Subject: A Promise

December 1, 1946

Dear Readers:

We of the editorial and sales staffs of Railway Engineering and Maintenance are bending every effort to bring you a better and more helpful magazine each month. Everything we do editorially, in seeking stories, reporting conventions, presenting outstanding addresses and papers, discussing questions of practical interest, and describing new products, is with a keen sense of our responsibility to bring to you monthly those things that will be of greatest help to you in solving your everyday problems. We of the editorial staff are happy in that responsibility.

But our sales staff also has and accepts a responsibility toward you—to bring to you each month in our advertising pages information concerning the products of manufacturers of specific interest to you, and it is more especially with respect to this part of our responsibility that I want to direct attention in this letter.

In our advertising pages, as with our editorial pages, both the quantity and the quality of the material presented are measures of value to you. As to the former, it cannot be said that we have fallen down during 1946. It is with some pride and satisfaction that I can report that, in spite of the unsettled conditions that have prevailed in industry during the last eleven months, Railway Engineering and Maintenance closes the year with the near-record volume of 826 pages of advertising, 34 more than in 1945, and not far below the all-time high of 833 pages in 1927.

I report this record of advertising pages with pride and satisfaction both because of the added valuable material we have been able to present to you in these additional pages, and because of the expression of confidence which it represents on the part of an increasing number of railway supply manufacturers that Railway Engineering and Maintenance is the most effective means of presenting their stories regularly to you.

As to the character and quality of the advertising in our pages, knowing your practical needs, we constantly stress that the most effective copy is that which, attractively, through word and illustration, tells you How, What and Why—and you may have noticed that an increasing number of our advertisers are adopting this advice.

In the year ahead, our aim will be to make both our editorial and advertising pages, in both quality and quantity, more valuable to you than ever before. It's a promise.

Sincerely,

Neal D. Howard
Editor

NDH:bh

Men and Machines MAKE PERFORMANCE ON THE JOB COUNT

Signal Maintainer—the doctor and nurse of a railroad's nervous system. Here knowledge must be sustained by professional integrity.

Safety and orderly function depend upon the positive functioning of those red, green and yellow lights. No higher standard of ethics prevails in the medical profession than those which govern the Men of Signal Maintenance.

And, like the doctor and nurse, Signal Maintainers must have adequate transportation, not only for regular "visits," but also for those emergencies when prompt response is a matter of life and death.

Recognizing the need, Fairmont provides especially designed motor cars of speed, flexibility and dependability. They also embody features of comfort that conserve energy and increase efficiency.

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Fairmont, Minnesota

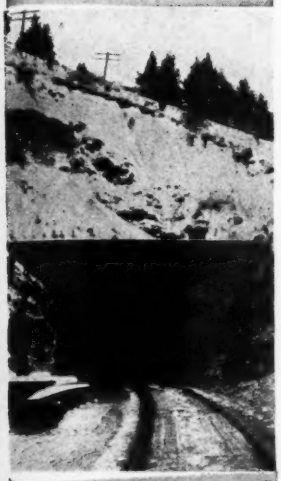
Fairmont Motor Cars
Speed, Flexibility and Comfort

The M9 — Series G — easily handled by one man. Of course, it embodies the rugged dependability of all Fairmont Motor Cars.

Fairmont
RAILWAY MOTOR CARS

Performance ON THE JOB COUNTS

OF ALL THE CARS IN SERVICE TODAY MORE THAN HALF ARE FAIRMONTS



Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

December, 1946

Published on the first day of each month by the

SIMMONS-BOARDMAN PUBLISHING CORPORATION

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This rugged integrally forged front rod extension is now equipped with Super Oilite Bearings, Hardened Steel Bushings and Pins. Now the inevitable flexing and distortion in conventional or bolted front rod assemblies can be eliminated.

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Ramapo's greater experience and facilities are ready to serve you.

Only Ramapo has plants from coast to coast to expedite America's Railroad needs.

Railway Engineering and Maintenance

Pessimism—

Far From Warranted by the Facts

Anyone on the railways or in the railway supply industry who may be inclined to be pessimistic about the future of rail transportation in the United States will be well advised not to "sell the railroads short" without considering all the facts. Admitting the basis for some concern, it is true that air and motor transport will afford stiff competition in the days ahead; it is true that the railroads are beset with heavy taxation, inequitable regulation, and unfair subsidies to their competitors; it is true they have long been denied the increase in freight rates they have been requesting since early in the present year to offset increased labor and material costs, causing them serious losses in earnings; and it is true they are beset with other troubles—but the railways are not licked, and far from it.

In the first place, the railways are well acquainted with adversity, for when during the last two or three decades have they not been faced with competition, high taxes, unfair subsidies and closely regulated earnings? They well know their adversaries. In the second place, while their earnings have dropped sharply from the 1942-1944 war peaks, their traffic, both passenger and freight, despite a tragic miscarriage of national industrial and economic readjustment following V-J Day, has exceeded, and continues to exceed, that of the boom year of 1929.

Third, since 1929 the country has had a population increase of approximately 18 million people, and the real post-war boom has barely begun, with everyone still in need of almost everything. And fourth, and of the greatest significance, the railways have "just begun to fight."

Many other factors in the offing are favorable to the industry and will tend to level off the advantages that have been held unfairly by its competitors, with beneficial effect, but the largest single factor favorable to the railways lies in their own rebirth of vitality and confidence in their ability to supply the public with what it wants—fast, safe and dependable transportation service—both freight and passenger—at the most reasonable price to be found anywhere in the world.

For example, consider what is in store for the train traveler of the future. Long before the end of the war, while at the time heavily burdened with war traffic, railway managements were looking ahead to a new era in passenger transportation, striking in comparison with anything in the past, with sleek, colorful, high-speed streamliners plying all of the important main lines of the country—and this is coming. Why this development has been slow in materializing, with the inauguration of only about a dozen new streamliners since V-J Day, when earlier plans called for at least 50 by this time, should be only too well understood by the hard-pressed public, which, because of wage disputes and artificial controls, still finds it difficult to secure much of what it wants.

But progress will not down, and the railways as a whole are dedicated to progress. Among those developments under way and in the early offing are still faster schedules, a wider variety of sleeping accommodations to fit every purse, more comfortable and commodious coaches, faster and better dining car service, increased luxury and comfort through improved air conditioning and lighting and public address systems for music and radio, transcontinental passenger trains, improved freight cars for specialized services at high speeds, faster freight schedules generally, improved signaling for increased safety and efficiency of operation, train radio communication, and still further improved motive power.

This is the railway industry of the future, if it does not lose its vision, if it will take advantage of all the technological developments of recent years,

and if it can count on the ingenuity, loyalty and aggressive support of its officers and employees, and of those in the railway supply industry. Working hand in hand to produce the finest transportation system and service in the world, while warding off unfavorable legislation and unreasonable demands of all kinds, these groups can go far to insure for the railways a secure place in the future of the country, with equal assurance of favorable working conditions and security for themselves.

Keep 'em Working—

An Idle Power Machine Is Expensive

IT MAY be trite to say that it costs money to own power machines and power tools, but the fact remains and cannot be ignored. There are certain charges that persist, such as interest and depreciation, whether the machine is idle or in active service. For this reason, machines that are purely seasonal and, therefore, lie idle for a considerable part of the year, cost relatively more than those that can be kept in service continuously during all seasons, except for the period that they must be sent to the shop for overhauling.

It is true that certain equipment, such as mowing machines and snow-fighting units, can rarely be used out of season, yet the returns from such units when they are in use may be of such importance that their ownership is profitable, even though they must remain idle for the greater part of the year.

Another type of equipment that was designed to be purely seasonal and that was used in this way for a number of years, is the weed burner. Neither the designer nor the many engineering officers that had been using this equipment conceived the possibility of its being useful in any other application than that of burning weeds.

On one road, at least, it took a long-continued storm that was accompanied by heavy snowfall, high winds and severe drifting to suggest another use for this equipment. When the car retarders at Markham yard, on the Illinois Central, at Chicago, became so nearly blocked that hand methods were no longer effective, a weed burner was brought in and soon had the retarders in working order. So effective was this burner that it was tried out on the switches in the classification yard where it quickly replaced 80 men and did a better job than they had been doing. Since then other roads have adopted the practice of utilizing weed burners for clearing snow in terminals and elsewhere where they can be used effectively.

This is an interesting example of an alert mind that was willing to sieze an opportunity that had not theretofore been grasped, even though it became necessary to step from the beaten path to do so. It more than doubled the value of the weed-burning equipment, in that the profits from its use in the new application were high. In fact, they were high enough to turn a loss through long periods of idleness to an over-all profit, while at the same time contributing materially to improved railway operations.

There is no reason why this should stand as an isolated example of the utilization of maintenance-of-way work equipment beyond the purposes for which it was designed. This does not mean that machines should be designed as general-purpose units, as such equipment has not proved to be satisfactory in most instances. To be fully effective power machines should be designed for specific purposes, but, as in the case that has been cited, alert maintenance officers can usually find other purposes for which they are equally adapted, thus increasing their usefulness, while at the same time reducing the cost of ownership.

Scrap Shortage—

Maintenance Men Must Help Again

AS THIS is being written the United Mine Workers are on strike and the country's steel-making industry, with its supply of coal cut off, is in the throes of a creeping paralysis. This situation may be of long or short duration, but it is certain to be resolved eventually, resulting in the return of the steel industry to volume production, a state of affairs which is vitally necessary if the railroads are to get the large quantities of rails, fastenings and other materials, devices and equipment containing steel, which they will need to carry out the extensive work programs they are planning for 1947.

There is one hitch, however, which may seriously restrict the output of steel even after the coal strike has been settled—this is a growing shortage of steel-making scrap, which, in fact, was already operating to restrict steel production at the time the coal strike started. As early as October 1, according to the Civilian Production Administration, a total of at least 25 open-hearth furnaces, with an annual capacity of 1,862,400 net tons of ingots, was idle because of a shortage of scrap. The fact that the annual capacity of these 25 blast furnaces is approximately equivalent in tonnage to the railroads' yearly requirements for new steel rail should be evidence enough that the roads—and particularly their maintenance forces—are vitally concerned.

The railroads have always been an important source of steel scrap, and a considerable proportion of the supply furnished by them is composed of material made available through the efforts of the maintenance forces. During the war, when a critical shortage of steel scrap threatened to curtail the country's war-making potential, maintenance men everywhere responded by carrying out intensified programs of scrap collection. Now, the Civilian Production Administration, alarmed by the threat to full peace-time production posed by the current shortage of scrap, has asked the railroad industry again to co-operate in the crisis.

To do their part fully all the maintenance forces need do is to revive the procedure that was followed during the war-time scrap collection campaign. But first they must have the incentive to do this, and to do it thoroughly. The incentive lies in the fact that, without a greatly increased flow of scrap to the steel mills, the possibility of the railroads obtaining their requirements of rails and other steel products in 1947 may be seriously jeopardized.

Tie Plates

What Size and Design?

By G. M. MAGEE

Research Engineer, Engineering Division,
Association of American Railroads

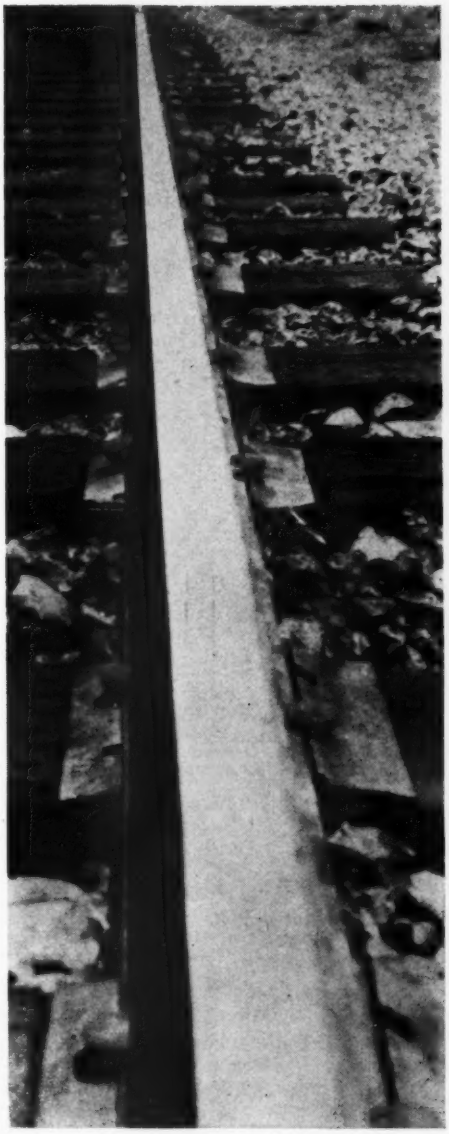
This article, presented originally as an address before the annual convention of the Roadmasters' and Maintenance of Way Association at Chicago, discusses the economics of tie-plate design, particularly with respect to the effect on tie wear of various sizes of plates. Also discussed are the results of field and laboratory tests of tie plates of several sizes and designs, with and without special fastenings. These experiments indicate that the tie plates used on sharp curves should differ materially, both in size and design, from those used on lighter curves and tangent track.

THE selection of tie plates involves two important considerations. One is to determine the most advantageous size and design of plate for the particular service conditions, while the other is to convince the management that a tie plate of the size thus determined is needed.

The principal functions of a tie plate are to distribute the load from the rail to the tie without undue destruction of the wood fibres, to provide a suitable bearing and cant for the rail base, and to hold the rail to gage. To properly protect the tie, the tie plate must have an area sufficiently large to prevent the wood fibers from being crushed. Complete and accurate information regarding the maximum load which the tie plate may receive under service conditions, and the intensity of bearing pressure that the wood fibers are able to withstand without crushing is not, as yet, available. Based upon the best information now available, it would appear that the maximum load on individual tie plates under the inner rail of curved track may be as great as 40,000 lbs., and on tangent track as much as 25,000 lbs., while laboratory tests indicate the maximum load that can be supported by the tie before rupture of the fibers takes place is 400 p.s.i. for hardwood ties, and 250 p.s.i. for softwood ties.

Assuming that the ties used on curves are all of hardwood, the foregoing figures would indicate that a tie plate area of 100 sq. in., or a plate approximately 7¾ in. by 13 in., is the size needed to prevent crushing of the wood fibers under maximum load conditions, both for hardwood ties on curved track and for softwood ties on tangent track. Similarly, it will be seen that an area of 63 sq. in. or a 7-in. by 9-in. plate is required for hardwood ties on tangent track. It is a question of economics as to whether the investment in tie plates should be made to provide for these extreme conditions of loading and strength, or for more average values.

It is not general practice in the United States to secure the tie plate firmly to the tie with a suitable fastening. Therefore, even if the tie-plate area is sufficiently large to prevent the crushing of the tie fibers, the fibers may be destroyed by the abrasive movement of the tie plate on the tie, which accompanies train movements. From experience in Europe we know that the present methods of treatment will give a tie life of 35 to 40 years if the tie is properly protected against tie-plate abrasion. Hence, the size of tie plate needed to reduce abrasion also becomes a question of economics, balancing the increased cost of larger plates against the longer life to be obtained from ties.



The Size and Design of Tie Plates Should Be Such as to Minimize Plate-Cutting of the Ties

The problem of making this economic determination between the cost of larger tie plates and the increased life of ties to be obtained by reducing crushing and abrasion of the tie fibers is difficult, if not impossible, to solve accurately. However, some theoretical considerations may be made, which will be helpful in arriving at a sound decision.

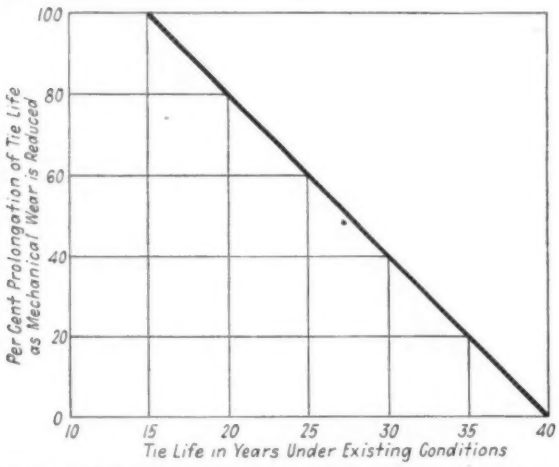
Tie Costs Have Doubled

Of first consideration is the cost of the tie. Obviously the more a tie costs, the more we can afford to spend to prolong its life. The following tabulation gives the average cost per treated tie for Class I steam roads of the United States and Canada for each of the past seven years:

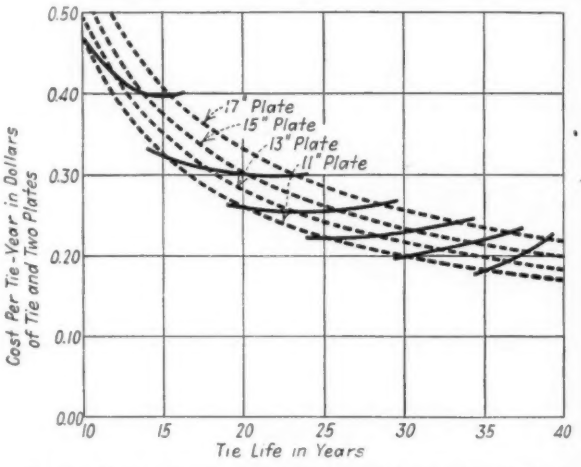
Year	Average Cost Per Tie
1940	$1.29
1941	1.31
1942	1.47
1943	1.70
1944	1.98
1945	2.26 (Est.)
1946	2.34 (Est.)

It will be noted that within the past seven years the cost of ties has almost doubled. If the higher prices are to continue, it is obvious that effective measures must be taken to prolong tie life. If the measures to be taken involve larger tie plates, then we are also interested in the price of the steel from which they are made. The base price for rolled steel tie plates during the same seven-year period has increased from $43 per net ton to $51. This is a substantial increase, but is still relatively less than the increase in the cost of ties.

The next consideration is the additional tie life that may be anticipated from increasing the size of the tie plate. Unfortunately, no comparative test data which would be helpful in this matter are available at the present time. Two years ago, comparative tests were started by the Track committee of the A.R.E.A. to compare the effect of different sizes of plates on tie wear. In one test, for which data are now available, involving 112-lb. rail, both 11-in. and 13-in. plates were installed on a 4-deg. curve and on tangent track, on new creosoted oak and new creosoted pine ties. On the 4-deg. curve, the 13-in. plates have worn into the ties 71 per cent as much as the 11-in. plates, and on the tangent track, 95 per cent as much. The average amount of wear in two year's time is about one-sixteenth of an inch, so that definite conclusions are hardly justified at the present time.



Reducing Mechanical Wear of the Tie Will Prolong Tie Life as Indicated on this Chart. It Will Be Noted That the Benefits Are Greatest When the Tie Life Under Existing Conditions Is Relatively Short



Each Solid Line Shows, by the Points of Intersection With the Dotted Lines, the Increase in Tie Life To Be Gained by Using Larger Plates Under Comparable Conditions, and the Corresponding Cost per Tie-Year

Ratio of Plate Area to Wear

Since both abrasion and crushing of the tie fibers may be expected to be directly affected by bearing pressure, and since bearing pressure is almost directly affected by the plate area, then the best criterion, at present, of the longer tie life to be obtained with larger tie plates is to base the rate of tie wear directly in proportion to the tie-plate area. For example, a 7¾-in. by 13-in. plate would be expected, on this basis, to produce tie wear at a rate 85 per cent as great as that produced by a 7¾-in. by 11-in. plate. This is not inconsistent with the test values given above.

Another condition which must be taken into consideration in determining the amount that reduction in the rate of tie wear will increase the life of ties is the tie life now being obtained under the track conditions where the larger plates are to be used. For example, if treated ties are giving a life of only 15 years under the track and traffic conditions involved, then reduction in tie wear could be considered to be 100 per cent effective in prolonging tie life. However, if a tie life of 40 years were already being obtained, the use of a larger tie plate to reduce tie wear would be of little value because decay would be the limiting factor in tie life rather than wear.

Taking as a basis for comparison a tie plate 7¾ in. by 11 in., the average cost per tie-year of a treated tie and two tie plates may be determined for various periods of service life ranging between 15 and 40 years, and shown as a curve representing cost per tie-year relative to service life. Then, by considering, as explained previously, that the rate of tie wear will be reduced as the area of the tie plate is increased and that the effect of reducing tie wear in prolonging tie life will be 100 per cent effective at 15 years and of no benefit at 40 years, then comparable tie-year cost curves can be determined for various sizes of plates. These tie-year cost curves show a very interesting comparison. If the average tie life being obtained is less than 25 years, then the larger size plates are more economical. If the average tie life being obtained is more than 25 years, there is no advantage in using a larger plate than is now being used.

However, there is one fact in this study of economics of tie plates that must not be overlooked. If it were not for the large reduction in tie renewals made possible by tie treat-

ment, it is difficult to see how the railways could have obtained a sufficient number of ties during the war years, and it is also certain that the price of ties today would be far greater than it is. Accordingly, I would favor being more liberal in selecting a tie-plate size than the relative economics of the moment would indicate, because it is certain that any reduction in the cross-tie requirements of the railways as a whole will eventually be effective in reducing tie prices, or at least assist in minimizing them.

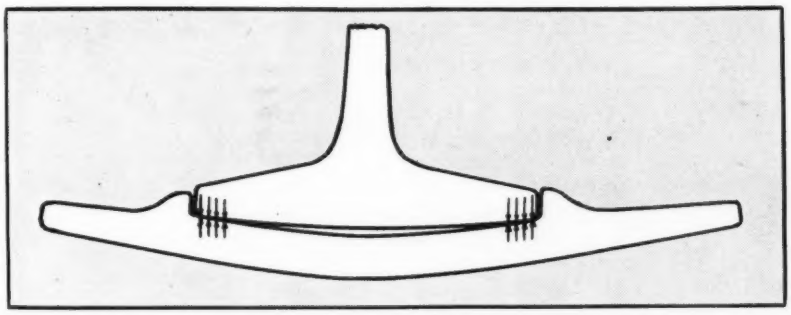
Special Fastenings

Measurements which we have been making of tie-plate wear at locations where two screw spikes and spring washers were used to secure the tie plates to the ties, indicate that a reduction in tie wear of approximately 30 per cent is being achieved. Tests show that, where the life of ties being obtained with an 11-in. plate is 10 to 20 years, the use of two screw spikes and spring washers as separate fastenings is much more economical than the use of a larger plate. However, the use of screw spikes has practical disadvantages in application and regaging which overbalance to some extent the benefits to be obtained by reducing the tie wear. If a tie life of 25 years is already being obtained with an 11-in. plate, then no benefit will be gained from using screw spikes.

Although the desirable area of the plate is primarily a question of economics, the design of the plate is determined by engineering considerations. The width of the plate should be as large as can be employed with the size of ties in use, since plate width is more efficient than plate length in reducing the bearing pressure on the tie.

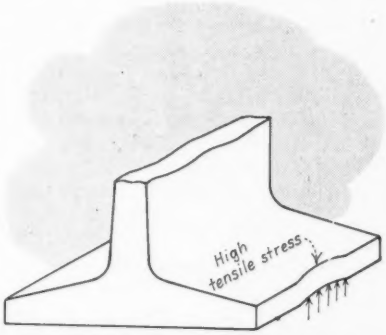
Most railways are now using double-shoulder tie plates with the thought that the inside shoulder holds the rail in better alinement, prevents tie skewing, and affords some anchorage. Most railways are using tie plates with a rail-seat cant of 1 in 40. We have measured the contour of worn rails in track and find that, with rail placed to standard gage, a 1-in-40 cant gives the most uniform wear across the rail head. If the cant is greater, the rail head will wear more on the outside; if the cant is less, then the wear will be greater on the gage corner. We are satisfied that the 1-in-40 cant is the best to use.

The design of the bearing seat to be provided for the rail base is also important. We have made extensive tests, both in the field and in the laboratory, of tie plates with flat rail seats, beveled rail seats, and rolled circular-crown rail seats. These tests show that the circular-crown rail seats develop excessively high localized stresses at the edge of the rail base under certain track conditions. Because the tie plate is more flexible than the rail base, it assumes a sharper curvature under load and, as a result, the entire tie reaction is applied to the edges of the rail base. In one laboratory test, the base of a short section of rail and a tie-plate rail seat were ground until perfectly flat. The tie plate was then supported on a flat white-oak block. Yet, when a load of 10,000 lb. was applied to the rail by the testing machine, a feeler gage could be inserted between the rail base and the tie plate at the center line of the rail base.



Showing Bending of a Tie Plate Under Load, With the Entire Reaction Being Applied at the Edges of the Rail Base

With the tie reaction applied at the edges of the rail base when the rail seat is flat, it is apparent that the use of a rolled circular-crown rail seat will result in concentrating the load at one point on each edge of the rail base. High lateral forces, such as those exerted on the inner rail of curves, cause most of the tie reaction to be concentrated at the outer edge of the rail base, producing excessively high tension stresses along the top outer edge of the rail base, directly over the point of bearing on the circular crown. Tension stresses developed under these conditions have been measured and found to be as high as 70,000 p.s.i., which we consider high enough to be of serious concern. We are in favor of using a tie plate having a flat rail seat with the edges of the seat beveled to prevent the rail base from contacting the sharp edges of the plate. This beveling can be done during the shearing of the plate.



Illustrating the Concentration of High Tensile Stress That Occurs at the Edge of the Rail Base Over a Rolled-Crown Tie Plate

Thickness

The tie plate must be sufficiently thick to avoid bending or breaking, and it has been found that additional thickness is of some value in producing more uniform bearing on the tie. By experience, it has been found that the thickness of the plate at the outer shoulder should be at least one-fifth of the projecting toe length. In the tie-plate tests for the Track committee mentioned previously, tie plates 11 in. in length and of various thickness were installed. The thinnest plates were 9/16 in. at the outer shoulder, or 0.18 of the toe length, and a few of these have bent under the inner rail of a 4-deg. curve. The next thicker plate used in the test was 11/16 in. thick, or 0.22 of the toe length, and so far none of these plates or any plates of thicker designs have been bent. Extensive stress measurements are being made of the different plate designs under service conditions, and complete information on the effect of plate thickness on developed stresses will be available later. So far no significant difference has been found in the amount of tie wear for plates of the same length but of different thickness.

Vertical loading on tie plates is generally accomplished by a certain amount of lateral thrust which, in general, is predominantly outward

(Continued on page 1304)

Machines Keep Terminals Open

ACCUSTOMED to climatic conditions each winter that would cause serious difficulties on most American railroads, the Canadian Pacific relies largely on a large amount of snow-fighting equipment to keep main lines and terminals open. Temperatures of 50 to 60 deg. below zero are not uncommon on many of the most northerly lines of this road, and Montreal, Que., one of the big rail terminals of Canada, has a heavier average annual snowfall (120 in.) than any other railway terminal of comparable size in North America. Such conditions, prevailing every winter, have provided this road with a background of experience in snow fighting far exceeding anything most United States railroads have known, and, for that reason, the methods employed in coping with them should be of considerable interest.

Briefly, the success of the Canadian Pacific in maintaining its operations in winter is based fundamentally on three factors; extensive preparation, plenty of equipment, and methods of operation and snow fighting based on years of experience. Under the plans which it has set up, all preparations for winter must be complete by September 15 of each year, and everything must be kept in readiness for snow storms and severe low temperatures until May 1. The preparations include having all snow-fighting equipment repaired, tested and ready for winter; having all portable snow fences in place; all air lines, compressors, steam lines and tools used for snow removal and disposal ready; and men lined up for such work as may be required.

Probably the most important factor is that of having plenty of work equipment, which must be in first-class condition when winter starts. Equipment alone, however, is not the complete answer, because nearly everything that operates on the railroad, and nearly every facility connected with operation, is designed to meet winter, as well as summer, conditions. For example, nearly every cut of any size is protected by two or three rows of portable snow fences, located some distance from the track; all rail joints are of a special design, with the nuts on the outside to accommodate flanger attachments on snowplows; and underground cables have been installed at a number of points where previous experience has shown that serious overhead line breaks might occur during sleet storms. As another example, turntable circle rails and transfer table rails are heated with steam pipes to keep the rails free of snow, and steam snow-melting pits are installed in all important turntable pits and usually at several other points in large yards.

This article will be confined to a description of the Canadian Pacific terminal operations at Montreal, one of the largest terminals on that road, which has 182 miles of tracks and 1,450 switches, and in which exceptionally severe winter conditions are normally experienced.

Much Equipment

After a heavy snowfall, yards are first spread with Jordan spreaders equipped with ice-cutters, and the snow is pushed away or is piled on suitable tracks to be loaded into trucks or on cars for disposal. In addition to the spreaders, a wide variety of other work equipment is used. For example, the equipment used at Montreal last winter was as follows:

- 1 Sicard snow-blower and loader
- 1 Barber-Greene snow-loader
- 4 Mercury-type trucks with revolving brooms
- 1 Bulldozer (extras rented)
- 5 Air compressors
- 3 Heavy trucks with 16-ft. snowplow blades
- 42 Snow trucks (rented)
- 3 Jordan spreaders
- 3 Ice cutter attachments
- 2 Lidgerwoods and plows
- 125 Hart ballast cars
- 7 Melting pits

In general, most of the snow is loaded by the Sicard snow-blower or by the Barber-Greene loader. The Sicard snow-blower is a special machine mounted on a heavy auto truck, which includes a front attachment consisting of a scoop about 10 ft. wide, a spiral scarifier and turbine-type fan, and an adjustable spout for loading snow onto cars or into trucks. When it is not desired to load the snow, the snow passing through the fan can be by-passed before reaching the spout and can be blown to one side a maximum distance of about 120 ft. This machine will work in snow up to four feet in depth and can load a ballast car in as little as one minute. Furthermore, the snow is blown into the cars so hard that it consolidates in the car, taking only about one-fifth the space of loose snow. The machine is equipped with rubber tires for road

A Truck Equipped with a Snow Plow, Removing Snow From Around Gantry-Crane Runways at Westmount Yard

in Winter

on the C.P.R.

Extremely low temperatures, with plenty of snow and ice, are an old story on the Canadian Pacific. This article explains the organization and methods employed to keep terminals operating, with particular reference to the methods and equipment used at Montreal, Que., where weather conditions are unusually severe.

The Sicard Snow-Blower Can Not Only Be Used to Load Cars or Trucks, but Also, If Desirable, to Throw Snow Far Into the Clear

use and with auxiliary flanged wheels so that it can also be used on the track.

The Barber-Greene loader is an endless-conveyor-type machine mounted on a tractor. The snow boom, or conveyor, consists of a belt with slats for carrying the snow to the top of the boom. The snow is unloaded at the top of the boom onto a horizontal shuttle conveyor, which can be inclined to one side or the other for loading into cars or trucks alongside. This machine will load a truck in 20 to 30 sec., and is used in team yards, on platforms, in car repair yards, etc.

The Hart ballast cars are used for snow disposal work. The loaded cars are taken out to elevated snow-unloading sidings and the snow is unloaded by a ballast plow and Lidgerwood. The cars have no ends and steel aprons are laid between them to permit the passage of the ballast plow from car to car. When this plow passes through, the side doors of the cars open automatically and the snow piles along both sides of the track. This is subsequently spread away from the unloading track by a Jordan spreader.

The bulldozers are used for plowing snow into windrows on team tracks and roadways so the Barber-Greene and Sicard machines can be used to better advantage in loading it. In some cases, the snow is loaded by crawler cranes with buckets, or with crawler tractors with front-end loaders.

Switches and Crossovers

In the most important terminals, where there are numerous switches and crossovers, a series of underground steam pipes, fed from a steam main, have been installed to melt the snow and clear the ground. Along

Above—A Truck Dumping Snow Into One of the Snow-Melting Pits at Montreal Terminals. Below—Watching the Snow Disappear in One of the Melting Pits

the lead tracks in some important yards, air tools and portable compressors are used to chip ice around switches. At these points, before the winter sets in, air pipes are laid along the tracks, with suitable connections for the compressors and the pneumatic ice-cutting tools. The air is also used to blow the snow and chipped ice away from the switches. Hydro-carbon gas (snow-melting oil), which is poured on the switches and lighted with a torch, is also used extensively around interlockings and other important switches.

Not many switch heaters are used on the Canadian Pacific, except for a few around interlockings plants. Years ago, experiments were tried in melting snow around switches with a direct application of steam, but this method caused bad icing conditions during extremely low temperatures and was abandoned.

Loading Snow Into One of the 42 Rented Snow Trucks Used at the Montreal Terminals

Platforms and Driveways

The Mercury trucks have revolving brushes which are mounted at an angle to brush ahead and to one side, and are used primarily to clear away comparatively light snowfall on important station platforms. Light tractors with angle snowplow blades are also used for clearing snow from platforms and station runways, depositing the snow in windrows for subsequent loading. Salt and sand mixed are used to melt the ice which forms on station platforms.

The heavy trucks with the 16-ft. blades are used for clearing station roadways, team track roadways, freight shed roadways, etc., for getting them into service quickly, after which the snow is loaded into trucks by the Barber-Greene or Sicard snow loaders. At many outlying locations, arrangements are made with municipal or local highway authorities to have their snowplows clean out station roadways as they pass by on adjacent streets or highways.

Snow-Melting Pits

There are seven large snow-melting pits in the different yards at Montreal. These are used to melt snow deposited by dump trucks. Smaller snow-melting pits are located in some of the turntable pits. At these points, the snow is pushed into the snow-melting pit with small hand-operated plows. At turntables and transfer tables a steampipe is placed alongside the circle rail and the transfer table rails—in each case to keep the rails free of ice and snow at all times.

Details of Construction

The snow-melting pits are constructed of old bridge ties and are lined with car sheathing. Each pit has a set of horizontal, perforated steam pipes near the bottom, a large grate-covered outlet near the top to carry off the overflow of melted snow, and a two-inch outlet plug in the bottom which is used only when it becomes necessary to clean out the pit.

The pits vary in size from 4 ft. by 4 ft. to 6 ft. by 6 ft. or 8 ft. by 5 ft. in plan, and from 3 ft. 6 in. to 6 ft. in depth. In all cases the steam pipes are 1¼ in. in diameter, but the length and number vary with the size of the pit. The 6-ft. by 6-ft. pit, for example, has five steam pipes 5 ft. 8 in. long. These, capped at one end, are connected into a two-inch header pipe at the other end, and each pipe has sixty 3/16-in. holes drilled along its top side. The overflow openings vary in size from 4 in. by 6 in. to 18 in. by 18 in. and are connected to an 8-in. drain pipe, which, in turn, is connected to a sewer. The bottom outlet is also connected to the 8-in. drain, and the plug can be removed from above. The cost of constructing the pits has varied from about $150 for the smaller units to about $256 for the larger installations.

Live steam at about 90-lb. pressure is used for melting purposes, and the pits are usually serviced from stationary power plants at enginehouses. The pits are full of water when in operation, and the steam agitates the water and keeps it at a sufficiently high temperature to melt the snow dumped into it; in fact, the water in the melting pits frequently approaches the boiling point.

Man-Power

Last year, it was difficult to get men, and yards were not cleared quite as fast as normally, but no serious train delays were caused on this account. When a heavy snowfall occurs at a terminal, the local roadmaster picks up all extra men available to assist in clearing operations, and these men are separated into day and night gangs to provide continuous operation. At Montreal terminal last winter, an average of about 112 men were employed when required, in snow removal work, with the maximum number reaching 233 at one time. These numbers do not include the operators of machines, but only those employed for cleaning out switches, railway crossings, shop tracks, team roadways and other inaccessible places. Including the operators of the machines and the section forces who devote practically all of their time to snow removal during storms, the Montreal terminals used a maximum of 304 men at one time, working on snow clearance last winter. During the previous winter the Montreal terminals had a maximum of 1340 men working on snow clearance operations at one time.

The various means of winter operation and snow clearance used on the Canadian Pacific have been developed under the general direction of W. M. Neal, C.B.E., the vice-president of the company. The men in charge of the work include the general superintendents and district engineers.

Thawing Frozen Water Pipes With Arc-Welding Units

By R. F. WYER
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Electric welding equipment, often idle during the winter months, is highly suitable for thawing frozen water lines. This article describes the methods of doing this work, and offers practical suggestions whereby more effective results may be achieved.

DURING the past few winters electric welding equipment has been used with considerable success for thawing frozen water pipes. The use of such equipment for this purpose has advantages because it is self-regulating and can be accurately controlled. In addition, the equipment is put to good use during a season of the year when it might otherwise be idle.

No special equipment, other than reliable pipe clamps for making firm electrical connections, is necessary for doing this work if welding outfits are used. Strap-type clamps of copper, having ample section to carry several hundred amperes, make the most desirable connections. However, C-clamps may be used to clamp the cable terminals directly to the frozen pipe if the strap connections are not available. To insure a good electrical contact, paint, rust, zinc oxide, and grease, which may be found on the pipe, must be removed at the point of contact, a file, rasp, or abrasive cloth being suitable for this purpose. A portable voltmeter will be found useful in checking voltage drops along the pipe and for determining the continuity of circuits possibly causing hazardous sparks. For reasons of economy it is desirable to get as close as possible to the frozen section of pipe without excessive digging in frozen ground.

When starting a thawing operation the welding equipment should be set at the lowest current output adjustment to permit checking the connections with the least likelihood of flashing.

Table I—Current, Thawing Time, Cable Sizes and Resistances for Different Pipe Sizes

Pipe Diameter in Inches	Recommended Amperes	Approx. Minutes to Thaw	Recommended Cable Size	Resistance per 100 ft. Cable (Ohms)
¼	75	15	No. 6	.0395
½	125	20	No. 2	.0156
¾	200	20	No. 0	.00984
1	250	30	No. 00	.00780
1½	300	30	No. 000	.00619
2	350	40	No. 0000	.00491
4	600	75	400,000 cm	.00270
6	800	120	600,000 cm	.00180

Connections

Connections at the welding generator should be made in the ordinary manner, with the work lead and electrode lead connected to the opposite ends of the frozen section of pipe. When the generator is turned on, the heat generated in the pipe wall by the passage of the current will thaw the ice in the pipe. As a precaution, electric cable should never be wrapped around the pipe in making connections, because it is almost certain to become loosened, thereby

Current

The most suitable current for thawing pipes has been found to be from 200 to 500 amp., but the time required to complete the job is dependent upon a number of conditions, including the size, length, and kind of pipe, its location, the condition of the surrounding soil, the extent of the freeze, and the temperature of the air. The accompanying tables will aid in determining some of the factors involved.

While the resistance given in the tables are for direct current, the reactance is so small that it can be ordinarily neglected when the cables are not coiled. Many variables enter into each case but the voltage necessary to produce the required current will be practically the same for both direct and alternating current. In Table III, the maximum output that can be obtained from several different units of arc-welding equipment, suitable for thawing work, is given.

In cases where the welding equipment is to be operated at less than 80 per cent of its current rating, the

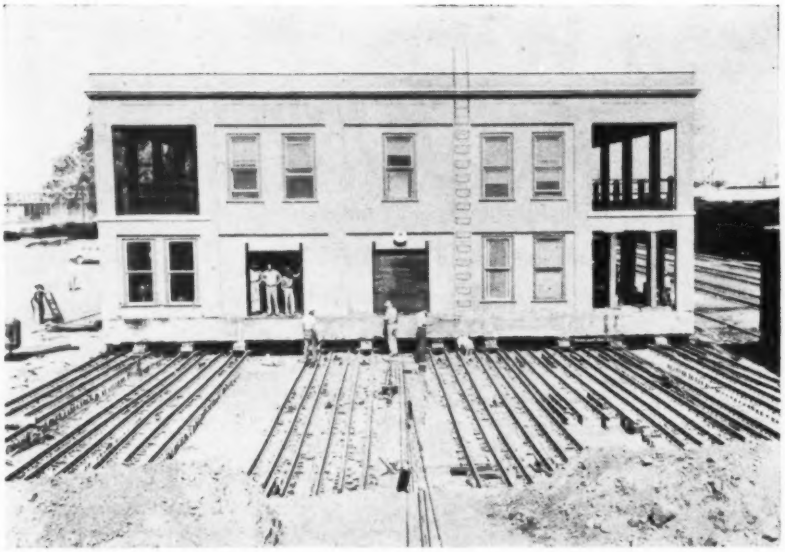
(*Continued on page* 1305)

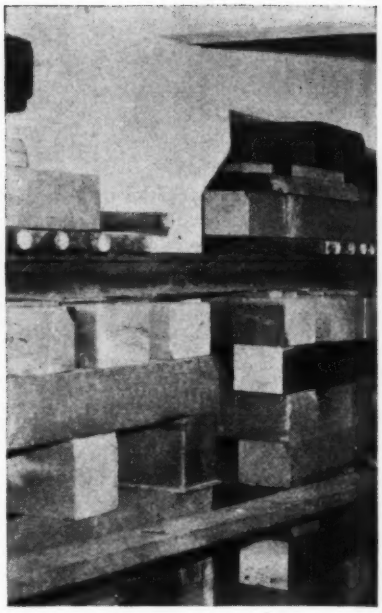
Table II—Ohm Resistance per 100 Ft.—Standard Pipes

Pipe Diameter	Wrought Iron	Steel	Copper Tubing	Lead	Cast Iron Class A
½	.026	.0198	.00824	.0234	——
¾	.0202	.01485	.00445	.01371	——
1	.0138	.0100	.0034	.00984	——
1½	.00842	.00618	.00208	.0064	——
2	.00625	.0046	.00133	.0053	——
4	——	——	——	——	.0092
6	——	——	——	——	.006

Table III—Maximum Output from Welders of Different Types and Sizes

Equipment	10 Volts	20 Volts	30 Volts	40 Volts
300-amp a-c welders	500 amp	450 amp	400 amp	375 amp
500-amp a-c welders	800 amp	750 amp	700 amp	625 amp
300-amp d-c welders	650 amp	600 amp	500 amp	400 amp
400-amp d-c welders	800 amp	750 amp	700 amp	600 amp
600-amp d-c welders	1200 amp	1000 amp	900 amp	700 amp





Above—The Lines of Rails and Blocking in Position for the Initial Movement. Right—Showing Part of the Roller Assemblies About One of the Columns Before It Was Cut Off.

Large Concrete Building Takes a Trip

To make room for an enlarged yard at Phoenix, Ariz., the Southern Pacific moved a two-story reinforced concrete store-and-office building a distance of almost 250 ft. without damage to the structure. This building, with vault and 54 columns, and weighing approximately 2,000 tons, was temporarily supported on blocking and metal plates, and was pushed on steel rollers over multiple lines of rails to a new foundation. Telephone and lighting facilities were maintained constantly throughout the work, which was carried out so gently that the occupants were unaware when movement was underway.

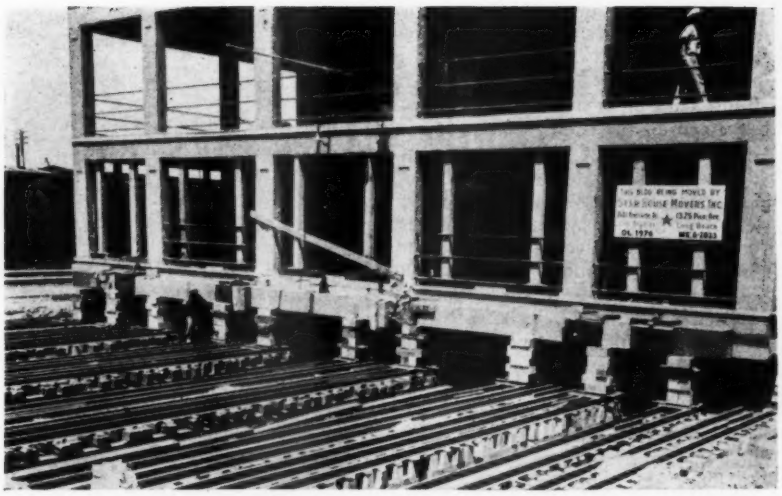
Three Winch-Equipped Trucks, Securely Blocked and Anchored to Deadmen, Furnished the Power to Move the Building. Jacks Gave the Initial Impetus

POWERED only by three winches mounted separately on trucks, a large two-story, reinforced concrete store-and-office building of the Southern Pacific Company at Phoenix, Ariz., was moved recently a total distance of nearly 250 ft. The building, with a vault, was blocked up on metal plates over steel rollers, was severed from its original foundation, and was pushed over lines of rails in two different directions to rest over footings previously prepared for it at its new location. During the entire course of the work, telephone and lighting facilities were maintained and the employees carried on their duties within the building without being aware of any motion of the structure.

This work was necessitated by a large increase in the number of cars handled by the Southern Pacific at Phoenix, which, in turn, called for the expansion of the existing yard at that point. To permit the construction of five additional tracks, it was necessary to relocate several units of fixed property about 180 ft. south of their present locations,

included among which was the two-story store-and-office building, 66 ft. by 145 ft. and 30 ft. high, having a basement and vault. This building, which lay in a general east and west direction, was supported on 54 reinforced concrete columns, with six lines in an east and west direction and nine lines in a north and south direction, the various columns extending down to footings below the basement floor, six feet below ground level.

It was decided to dispense with the basement in the relocated building, and to raise the structure 9⅜ in. higher than in its original location. The new site selected for the building lay 72.2 ft. east and 177 ft. south of the original location, and plans were made to move it by making two right-angle movements, first eastward and then southward.



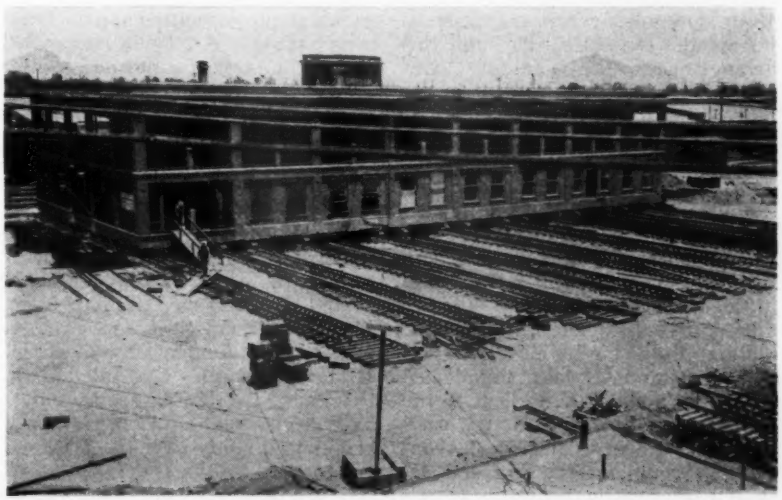
The Pulling Cables Were Fastened to Heavy Timbers Attached to the Rear of the Building, Thereby Moving It by a Pushing Motion

Preliminary Work

To clear the new site and construct footings to receive the building, it was necessary first to relocate a salt tank and to move a 100-ft. by 175-ft. oil sump approximately 200 ft. to the south. Furthermore, a considerable amount of preliminary work had to be done directly at the building itself before actual movement could begin. This included the removal of concrete curtain walls between the exterior columns; the laying of several double lines of 75-lb. tee rail on wood blocking to serve as a runway for rollers; the mounting of metal roller plates over the steel rollers; the blocking of an 8-ft. by 16-ft. vault and the 54 columns of the structure on the roller plates; the removal of an elevator from the building; and the separating of the building from its foundation.

The concrete curtain walls between the exterior columns were cut out to lighten the weight of the building. At the same time, temporary posts of Oregon pine, 8 in. by 8 in., were placed on each side of the columns between first and second floor levels as a precautionary measure. Following this, preparations were begun for the eastward movement by leveling off the ground area east of the building and placing the roller runway. In building the latter, cribbing blocks were placed in lines parallel with the six lines of building columns, and were extended back within the basement, to support strings of 75-lb. tee rails. This involved some 10,000 pieces of 6-in. by 8-in. by 4-ft. long blocks of Oregon pine laid in 18 parallel lines, the placing of which required careful attention to assure the support of all runway rails on an even transverse plane.

The New Site Was Graded and Footings Were Built in Advance for the Building



The Building at the End of the Eastward Movement, with the Lines of Rails and Blocking in Position for the Next Move at Right Angles. Note the Temporary Gap Across Roadway for Vehicular Traffic While the Movement Was Under Way

Two lines of rails, spaced approximately two feet apart, were laid along each of the six column lines, with one line on each side of the columns and with the top of the rails 3 ft. 10 in. below the first floor level. Additional lines of rail were laid in pairs to support the vault and the end walls. Rollers of steel shafting, 1⅞ in. in diameter and 30 in. long, were then assembled on the rails in groups of eight under the concrete girders on each side of the columns. Following this, a roller plate, 16 in. wide, 48 in. long and ¼ in. thick, was placed over each group of rollers and timber blocking was installed on top of the various plates to transfer the building load to them when the columns were severed. In all, 18 double lines of runway rails were laid and 100 shoes placed under the building, including those under the vault and end walls.

The movers then cut all columns and the vault and side walls, taking out sections in each case extending from the top of rail to an elevation about two feet below the column corbels, thus transferring the building load of more than 2,000 tons to the roller assemblies, and the structure was then ready for its eastward movement.

Moving the Structure

Prior to the severance of the building from its foundation, three motor trucks equipped with winches were located a short distance to the east of the rail runways and were securely blocked and lashed with steel cables to deadmen placed ahead of and behind them. Wire rope tackle, connected to the winches, was then carried under the building to its west end and was attached to 16-in. by 18-in. Oregon fir timbers fastened behind the structure. Through this arrangement, the building was pushed rather than pulled in its movement along the runway.

The winches were set in motion on June 5, 1946, at 8:38 a.m., and, with two hydraulic jacks furnishing the initial impetus, the building began to move. This movement commenced so easily, and its continuation was so gradual, that employees in the office of the building failed to take notice of it. The raising of the building to the higher elevation, previously mentioned, was accomplished by giving a suitable gradient to the rail runways provided for the eastward movement. The work continued throughout the day and despite numerous stops made to adjust the rollers and tackle, the building had been moved the required 72.2 ft. to the east by 4:55 p.m., in slightly more than seven working hours.

The North Side of the Building During Its Southward Move. Part of the Old Foundation and Some of the Cut-Off Columns May Be Seen in the Left Foreground

Upon completion of the eastward move, the building remained at that point until July 10, while the lines of rails and cribbing were changed to provide for the movement of 177 ft. to the south at right angles to the initial movement. These changes involved the laying of 21 lines of blocking and a similar number of double lines of supporting rails; the more arduous task of turning the shoes and rollers for the southward movement; the relocation of the "pusher" timbers from the west to the north side of the building; and the re-stringing of the wire-rope tackle to the re-spotted and anchored winch trucks. A temporary gap was left in the lines of rails and blocking across a road that intersected the southward movement, to permit the unobstructed flow of traffic.

The Southward Movement

The structure was started on its move southward on July 10, when it was moved 41 ft. to the edge of the road. The next day the gap in the lines of rails and blocking was closed and the building was moved 117 ft. farther south. On July 12, by 9:45 a.m, the building was moved 19 ft. to its final location, resting on cribbing, directly over the previously prepared footings.

The next step was the construction of new sections of reinforced concrete columns and walls between the new footings and the stubs of the original columns and walls left pendant below the first floor. The new column footings had been made 5-ft. 6-in. square and 1-ft. 3-in. thick, with a key slot in the top of each to supplement reinforcing bars which were carried up into the new column area. The new column sections were made 2-ft. 4-in. square, and were carried up to enclose about 1 ft. of the bottoms of the stubbed columns. New reinforced concrete wall sections were likewise built between the footings and the pendant vault and side walls.

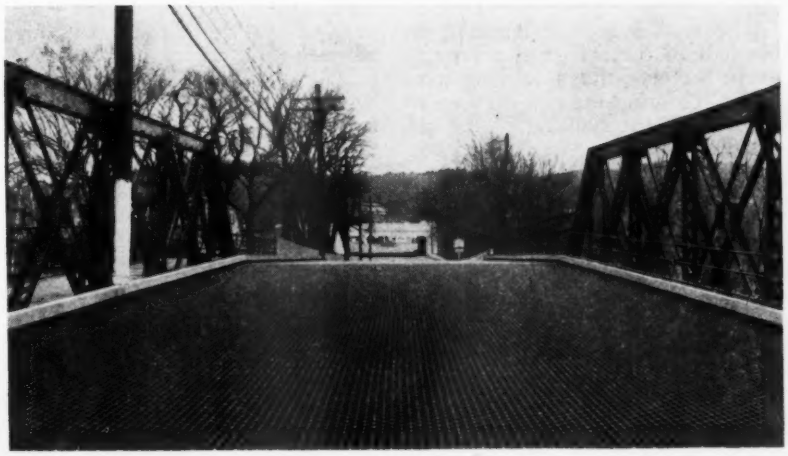
Building Not Damaged

The concrete was allowed to set for 18 days and the cribbing, rails, and rollers were removed from under the building through three openings left in the new side walls. After the building rested on its new foundation, a careful instrument check and close examination of the structure showed that it had been moved without damage of any kind.

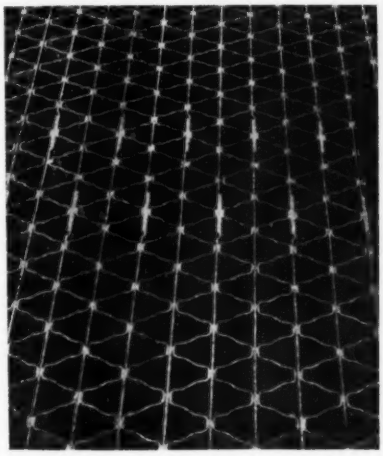
The project was under the general direction of E. E. Mayo, chief engineer of the Southern Pacific Company, and under the supervision of the road's Tucson division forces; G. A. Bays, division superintendent, and T. W. Saul, division engineer, with Gus Schneider, assistant engineer, in charge of field operations. The work of moving the building and setting it at its new location was performed, under general contract, by the Star House Movers, Los Angeles, Cal.

Open Deck on Overhead Bridge Reduces Upkeep Costs

This article describes the deck replacement on a highway bridge over tracks of the New Haven at Millbury, Mass., in which a wooden floor gave way to an open deck of subway grating, protected below by asbestos-cement blast plates. This construction, although more costly initially, is expected to effect economy through increased service life and substantially lower maintenance costs.



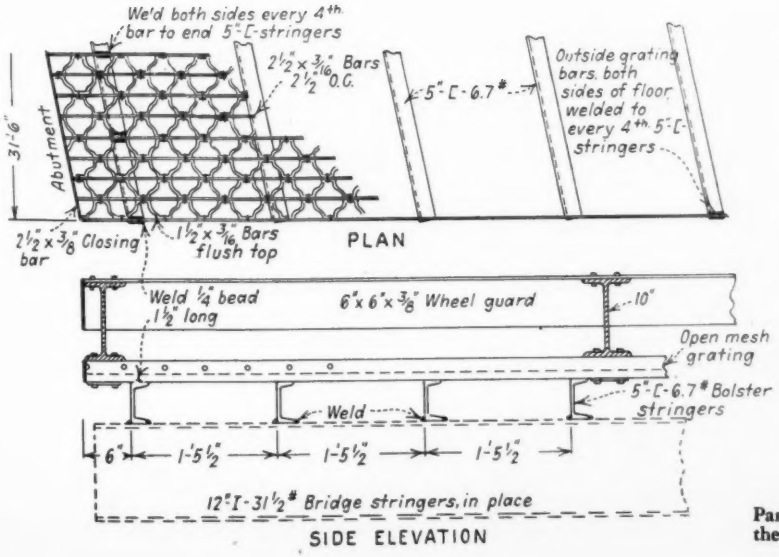
Right—The Elm Street Bridge as Seen from the Deck Level. Below—Close-Up View of a Section of the Grating Employed



A FEW years ago, in an effort to reduce the cost of maintaining the timber deck of a street bridge over two tracks of the New York, New Haven & Hartford, at Millbury, Mass., and, at the same time improve the riding conditions over the bridge, the old deck was replaced with Irving subway grating—an open-type structural flooring, laid in panels riveted together to afford a smooth continuous deck. To the present time this new deck has been standing up well, substantiating the claims made for it, and with every indication that maintenance costs will be at a minimum for a number of years to come.

The new deck was installed on the Elm street bridge at Millbury, which, in addition to crossing the tracks of the New Haven, also carries vehicular traffic over the Black river at that point. The new construction cost about 50 per cent more than replacement in kind with planks, but, at the time, the known superior wearing qualities of the subway grating were expected to result in a saving of approximately 30 per cent in renewal costs over a 20-year period. Through the open feature of the new deck much of the dirt and snow that would accumulate on a solid wooden deck falls through, keeping it relatively clear. Locomotive stack blasts that would normally rise through the floor are prevented by Johns-Manville corrugated asbestos-cement blast plates on the under side, which also protect the grating and its supporting steelwork against direct blast action.

The Elm Street bridge consists of two slightly skewed through-truss spans, 80 ft. and 90 ft. long, respec-



Part Plan and Elevation of the New Deck Construction

tively, carried on two abutments and a center pier. It has a roadway 31½ ft. wide, with a sidewalk on each side outside the trusses, supported by cantilevered beams. The roadway deck is carried on transverse I-beams and longitudinal stringers of 12-in channels. The original wood deck, of two layers of plank had four lines of steel traffic plates.

New Deck

The new deck was installed on one-half of the bridge at a time to avoid the necessity of closing it to traffic. To bring the new deck up to grade after the removal of the old wooden deck, new 5-in. channel bolster stringers were installed transversely on the main channel stringers, 17½ in. back to back, and were welded to them, following which the new steel floor grating was welded to the bolsters. At the same time new roadway wheel guards, consisting of 6-in. by 6-in. steel angles supported on short sections of 10-in. I-beams, were bolted securely to the grating along both sides of the deck.

In the blast-plate protection afforded the deck and vehicle traffic moving over it, a continuous area between three adjacent transverse I-beams, and the full width of the bridge, was given protection by the corrugated asbestos-cement sheets, which were laid up in the form of a light, double-pitched roof over the railroad tracks. Using sheets 12 ft. long on each side, lapped at their edges and joined in a ridge directly above the center line between tracks, the deck is afforded protection over an area 24 ft. by 31½ ft. This blast-plate construction is supported by 2½-in. by 2½-in. by ¼-in. galvanized steel angles, secured by ½-in. Sheradized hanger bolts and galvanized clips. The work also included one coat of graphite field paint on all the steelwork under the deck.

The deck renewal work described was done by the Town of Millbury, Mass., under the direction of Lester W. West, consulting engineer, Worcester, Mass.

Above—Excavating the Trench with the Tractor Equipped with a Boom and Dragline. Right—The Rear Winch Was Used to Pull the Pipe Into Its Final Position. Below—Bulldozing a Section of Pipe Into the Trench

Tractor Installs Culvert Pipe

WHEN a 36-in. concrete drain pipe was installed under a secondary track on the Northern Pacific recently, a Caterpillar Diesel D-4 tractor, with attachments, was used to advantage in performing several phases of the work. In the first step, the trench for the drain pipe was excavated by the tractor using a double-drum winch, a boom attachment and a dragline bucket. When the excavation work was completed, the dragline bucket and the boom were disconnected and the tractor used to bulldoze the pipe sections into the ditch, after which the sections were shifted into final position with the aid of the double-drum winch. The bulldozer attachment was then brought into use again to complete the backfilling. The Standard Construction Company, Duluth, Minn., was the contractor for this work in which about 40 ft. of 36-in. pipe was installed in a nine-hour day.

On-Track Grouting Machine Used Effectively on the I. C.

When it was decided some time ago to pressure grout the roadbed in an important tunnel on its lines, the Illinois Central devised an effective, home-made on-track grouting machine by combining an old weed burner and a mud jack, which made it possible to reach any point in the tunnel at will, and, at the same time, clear the track readily for all train movements. With the completion of the tunnel work, the road has found this machine equally effective for grouting main line and yard locations, especially where narrow shoulders or other conditions would make difficult the use of off-track equipment. This article describes the machine and discusses briefly its method of operation.

A SELF-propelled, track-mounted, pressure-grouting machine is being used by the Illinois Central, in which a mud jack and the chassis of an obsolete weed burner have been combined to form a highly effective piece of maintenance equipment. This unit of equipment was built originally for use in stabilizing the roadbed in an important single-track tunnel where it was essential that the work be carried out with minimum interference to traffic. The unusual combination of equipment devised performed so satisfactorily in the tunnel that, upon the completion of the tunnel work, it has been continued in service grouting the roadbed at numerous main line and yard locations, especially on fills or in cuts, or where other restricting conditions have made the use of off-track equipment difficult.

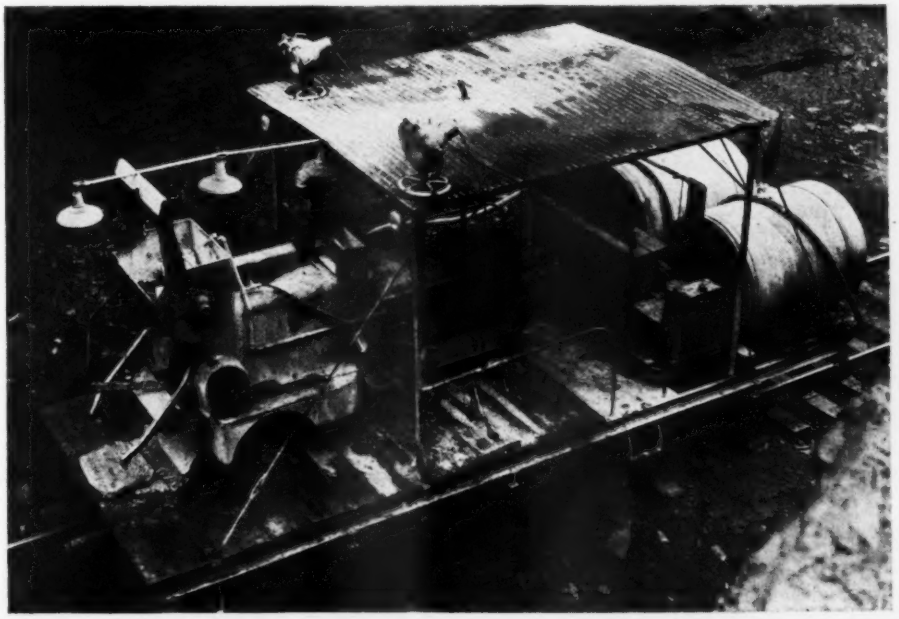
In building the on-track machine an early model Fairmont M-27, oven-type weed burner was stripped of all of its attachments except fuel tanks, propelling engine and travel gear to form the chassis, and a Koehring mud jack, complete with engine and skip, was mounted on its front end, and so placed that the line of motion of the skip is toward the front and parallel with the track. A small, gasoline-driven pump was also mounted on the chassis to pump water from the tanks into the mud jack, as desired, completing the alteration of the burner. Over-all, this unit has a working deck 9 ft. by 24 ft., the larger part of which is covered by a canopy constructed of corrugated metal.

Travel Speed Is 20 M.P.H.

Assembled with the grouting machine are a 105-cu. ft. portable, track-mounted air compressor used to supply air for pre-driving the grouting holes, and a specially designed, heavy-duty trailer for carrying the supply of cement and sand or fly ash used in the grouting work. The compressor is coupled to the rear end of the machine and the trailer to the front end, next to the mud jack, and the entire assembly is moved as a unit to and from the points of work, at speeds up to 20 m.p.h.

At the start of the day's work at any location, the tanks are filled with water to their capacity of 950 gal., and the trailer is loaded with cement and the mixing aggregate. The company built special trailer for the grouting equipment has a capacity of 10 tons and is of all-steel construction. Its bed, 8 ft. by 13 ft., is divided into two compartments, the sand compartment having a 6-cu. yd. capacity, while the smaller cement compartment has ample room for 50 sacks of cement. These quantities of water and material are usually sufficient for more than a half-day of grouting under normal conditions.

The mud jack is a self-contained machine, with a mixing drum and hydraulic pumps driven by a gasoline engine, the pumps being used to force the grout through the dis-



The On-Track Grouting Machine Showing the Mud Jack Mounted on the Chassis of an Early Model Weed Burner on Which the Fuel Tanks, the Engine and the Travel Gear Are Retained

Above—The On-Track Grouting Equipment in Operation. Left—Another View of the Outfit. The Grout Points Are Driven by an Air Hammer

charge lines and grout points, into the subgrade. The discharge lines used with the mud jack are 50-ft. lengths of 1¼-in. hose, designed especially for the high pressures often encountered with this machine. The grout points, also of special design, are of pointed lengths of seamless tubular steel, each with an angle connection near its top for quick connection of the discharge lines. The points are driven 6 to 10 ft. into the subgrade with the aid of pneumatic air hammers, the air for which is furnished by the compressor, forming a part of the equipment.

Small Force Required

A force of 10 men is usually employed in the grouting operations with this equipment, including a foreman and the mud jack operator. The remaining eight men are recruited from the track forces in the localities where the unit is working.

When grouting with the machine, a mixture consisting of 1 sack of cement, 4 cu. ft. of sand, and 6 to 10 gal. of water is normally used, although this is varied as necessary to meet local conditions. At some locations, ½ sack of fly ash, or other pozzolithic material, is substituted for a like quantity of cement to improve the dispersing quality of the grout.

The daily capacity of the grouting equipment depends primarily upon traffic conditions and to some extent upon the character of the work being done. It is the general practice to occupy the main track only when at least 30 min. work can be done, exclusive of running time to clear. Therefore, it is necessary to work in close co-operation with the dispatcher, and to make full use of sidings and passing tracks. The record thus far for one day's grouting stands at 209 batches, or 1,045 cu. ft. of grout, placed in eight hours.

Last winter, after more than a year's satisfactory service in general roadbed grouting, the equipment was withdrawn from service and given a general overhaul at one of the division's roadway equipment repair shops. Early this past spring it was again placed in service and has since been in almost continuous operation grouting open track, including a number of stretches of important tracks in the yard and engine terminal of the road at Carbondale, Ill.

The equipment described was developed under the direction of C. H. Mottier, vice-president and chief engineer of the Illinois Central, C. M. Chumley, engineer maintenance of way, and R. E. Buss, superintendent of maintenance of way equipment. It is being operated under the immediate supervision of the various division officers.

Tie Plates

(*Continued from page* 1293)

and is much greater on curved track than on tangent. The effect of this thrust is to throw more of the load on the outer end of the tie plate and, to offset this and produce the same rate of tie wear at both ends of the plate, the outer end of the plate is made longer. One-half of the excess length of the outer end of the plate is referred to as the eccentricity of the plate because the center of the rail seat will be eccentric with respect to the center of the tie-plate length by this amount.

From our tie-plate stress measurements and from measurements of tie-plate cutting on various railroads, it is evident that a tie-plate eccentricity of about ¼ in. is needed for tangent track, while one inch or more is needed for sharp curvature. It has been the practice to use the same design of tie plate for both curved and tangent track, but we are convinced that the advantages to be gained from using a different design of tie plate on sharp curves outweigh the cost of stocking the additional section and the extra work involved in keeping the designs separated and properly located in the track.

The advantages to be gained from using a plate of different design on the sharper curves, and some of the considerations involved, are:

(1) The load on the tie plates on sharp curves is much greater, and the life of the tie is much shorter. The larger plate will spread the load over a larger area, thereby decreasing the wear and increasing the life of the tie.

(2) The use of a tie plate with greater eccentricity on sharp curves will cause the inner and outer edges of the plate to wear into the tie at the same rate. When plates without sufficient eccentricity are used, the outer end digs into the tie more rapidly, causing wide gage. In regaging the track, the life of the tie is further shortened by spike killing.

(3) Because of the even wear of the plate edges, the necessity of readzing the tie to restore the proper rail cant will be eliminated and a

much better condition of rail bearing will be provided when tie renewals are made in curved track.

At the present time, A.R.E.A. standards provide the same design of tie plate for both tangent and curved track. When our research is completed, I am certain that the advantages of using one design for tangent and light curves and a different design for sharp curves will be clearly indicated.

The design of the bottoms of tie plates has been the subject of extensive experimentation. If separate plate fastenings are used, I think there is little doubt but that a flat bottom is the most desirable. However, where only the rail spikes are used to hold the plate, our tests show that there is a tendency for the plate to move laterally on the tie to the extent permitted by the clearance between the spikes and the spike holes. We believe that, where no separate tie-plate fastening is used, there may be some advantage in having two transverse ribs on the bottom of the plate, located just inside each edge of the rail base, to restrict the lateral movement of the plate.

In closing, I emphasize the need for careful tie adzing before installing new tie plates. This is especially important now that longer plates are being used because, if the adzing is not carried deep enough, the new plates will be supported by a narrow ledge at each end, which may often result in the tie plates being broken or bent.

Thawing Pipes

(*Continued from page* 1297)

operation of the unit can be continuous. For example, a 400-amp. d-c. set can be operated continuously at 320 amp. without damage. However, if it is desired to operate the set at the maximum rated capacity, such operation must be for intermittent periods not exceeding 15 min. in length, and sufficient time must be allowed between the periods of full operation for the unit to return to its normal temperature.

A number of precautions must be observed when using arc-welding equipment for thawing purposes. If the connections between the copper cables and the water pipes are not good, and if resistance at these points is high, excessive heat will be generated. If an arc forms at the connections, damage to the pipes may occur.

Care should be taken to select the correct amount of current, particularly when it is known that the frozen pipe is of lead, because this material will stand much less current than will iron. Also the pipes should be disconnected from other piping before the welding equipment is connected so that the current has only one path in which to travel. If this is not done, and other electrical devices are grounded to the water pipes, the grounding connections will be raised above earth potential, and the ground wires may burn out and cause a fire.

In using single-operator direct-current sets, two points should be noted. The use of low-load voltage may result in unusually heavy current on the lower taps of the welding machine and, since these taps are designed to carry the low current drawn at normal operating voltages, overheating of portions of the series field may result. This can be avoided by setting the units on the highest taps and the lowest open-circuit voltage, a combination which will give the desired current.

In addition, the low-load voltage should be considered in making an estimate of the current setting required. Since voltages in the neighborhood of five or six will often be encountered, the output current on any setting will be as much as one and one-half times that which would be drawn by a welding arc. However, when transformers are used the current drawn by the load will be very nearly that indicated on the name plate.

Steam Heat to Keep Ice Off Rails

A method of using steam heat to prevent ice from forming along the rails in locations where cars of coal, slag or other materials are left standing has been used successfully at the coal storage yard of the Hudson Coal Company at Olyphant, Pa. In this method the pipe used to convey the steam is placed in direct contact with the rail along the outside face of the web, directly below the head, rather than adjacent to the rail on the ties.

In the installation at Olyphant, ¾-in. radiant heating pipe was used, which was welded in the field into lengths of several hundred feet, and then laid on ½-in. galvanized bolts that had been welded at intervals to the webs of the rails. Protection of the pipe from melting snow and corrosive drip water from cars of washed coal was achieved by installing a continuous cover plate curved to fit under the rail ball and over the pipe, which was fastened in place by means of the same bolts that support the pipe.

This application, for which 5,500 ft. of ¾-in. Rayduct pipe, furnished by the Bethlehem Steel Company, was used, was made on 2,700 ft. of track in the storage yard at Olyphant. It is reported that the installation has produced considerable savings in steam consumption and that more efficient dissipation of moisture has resulted. The photograph shows the pipe being applied to a rail. Note cover-plate sections ready for application.

Lubrication of Motor Cars

Part I

By G. R. WESTCOTT
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No. 10 of a Series

This installment of the series on the care, selection and operation of track motor cars is the first of two articles that will discuss the many aspects of the problem of lubrication. Aside from a brief discussion of responsibility in achieving correct lubrication, Part I is devoted primarily to the considerations involved in lubricating two-cycle engines. The qualities necessary in a lubricant if satisfactory results are to be obtained are discussed at length.

AS WITH all machinery, the correct lubrication of a motor car is very important. No other detail in the operation of the car will influence, to the same degree, its length of life and the nature of the service secured from it.

It has been said in a previous article in this series, that too often the motor car, because its use in maintenance work is supplementary rather than direct is not given the care that its importance warrants. This is true particularly with regard to its lubrication. The men using a car, or their supervising officers, will often be heard to say of an inferior or unsuitable oil or grease that "it will do for the motor car;" and the same men will blame the car, its builder, or the maintainer, when it wears out quickly, costs excessively to maintain or fails frequently in service. Even granting that the use of the car is supplementary in maintenance work, it is still entitled to as much care in lubrication as a tamper, a power wrench, or any other maintenance machine.

The cost of the necessary lubricants is insignificant in comparison with the benefits obtained by careful lubrication. This is true, not only as to the amounts used but as to their quality and suitability as well. The purchase of inferior or unsuitable oils or greases is likely to prove costly in shortening the life of the car or its parts and in the failure of the car when most needed. Often, too, any initial saving is eliminated immediately through the need to use more lubricant because of its inferior quality.

Responsibility

The responsibility for correct lubrication is divided. The operator or foreman in charge must see that the lubricants are applied regularly. Haphazard or irregular lubrication will not give good results; there must always be a film of lubricant between moving parts or wear is certain to occur. If, on the job at hand, there are several different types of lubricants for different parts of various machines, it is also the responsibility of the man in charge to see that the correct ones are used on the car.

The responsibility of the man in charge of the car, however, is one of use only; if the oil and grease furnished are not of suitable grade or quality, the results will be poor, even though he is most careful in their application. There is, then, a responsibility of selection; somewhere in advance of the purchase of the lubricants, determination must be made as to the suitability of those offered. In this, considerable weight may be given the reputation of the manufacturer of the lubricants. The lubrication field, however, is a large one, and the needs of the motor car are in many ways special and entirely outside the experience of many manufacturers' representatives. The recommendations of these men, therefore, are not generally to be given too much consideration, unless confirmed by field tests. The recommendations of the motor car builder are generally based on such tests.

A technical discussion of oil and grease specifications is avoided here for two reasons; first, the relation of many of the characteristics covered by the specifications to the work the oil has to do is too involved to be of practical value in the selection of a lubricant, and second, there is a lubricating ability in a good oil or grease that, while not independent of the characteristics specified, is not clearly defined by them.*

The lubrication of a motor car involves two distinct features: (a) the lubrication of the engine requiring the use of oil, and (b) the lubrication of the chassis, the transmission system and other moving parts. For the latter, there may be a choice in the type of lubrication used, based on the design of the equipment, climatic conditions, availability of lubricants, or other conditions.

The most exacting lubrication requirements on a motor car is in the engine, where the oil must lubricate the bearings and the cylinder walls.

*For a comprehensive discussion of the relation between specifications and lubricating qualities of oils and greases, the reader is referred to a report on the Lubrication of Roadway Machines presented to the American Railway Engineering Association by a committee headed by C. M. Angel, engineer of tests of the Chesapeake & Ohio, which contains much of practical value in the selection of lubricants for use in portable machines and is applicable to motor cars. The report is found in Vol. 43 of the Association's Proceedings, pages 193-206.

The service is severe as the speed of the moving parts and the engine temperature are both moderately high. It is essential that considerable care be exercised in the selection of the engine oil, and in this, distinction should be made between "grade" and "quality." As used here, grade is taken as a measure of the viscosity of the oil. Formerly, oils were graded as light, medium, heavy and extra-heavy, and there was no uniformity among oil manufacturers in the use of these terms. What one manufacturer termed a heavy oil might be similar in grade to another manufacturer's medium.

This situation led to much confusion, and the adoption by the Society of Automotive Engineers of standard viscosity ratings was a great improvement. Under these ratings, the viscosities of two oils of SAE 30, for illustration, were known to be in general agreement at certain fixed temperatures. The SAE grading is deficient, however, in that the temperatures at which the viscosities are measured are far from those which the oil will meet in actual use; the oil may comply with the SAE grade at the specified temperature, but may become nearly solid in the crank case of a cold engine at a low temperature, or it may lose practically all of its viscosity and fail to furnish the necessary film of oil between bearing surfaces at the temperature in the cylinder of a hot motor. The SAE ratings, therefore, should be considered as a guide in the selection of oils to be* tested rather than of oils to be used; except that, when a specific oil has been found to be of suitable quality by test, the SAE rating thereafter can be taken safely as a guide in determining the grade to be used.

Requirements for Engine Oil

The conditions imposed on the oil in use vary greatly and features other than the viscosity of the oil at the specified temperature will determine how these conditions will be met. Stated in non-technical terms, some of the features that mark the quality of an oil are:

(a) The ability to retain sufficient viscosity at operating temperature to provide an oil film between bearing surfaces. The operating temperatures depend on the type of engine, the compression ratio, the method of cooling, and other considerations.

(b) An "oiliness", or low coefficient of friction sufficient to permit free movement. (Viscosity, the ability to resist fracture of the oil film, and oiliness, the ability to permit free movement within the lubricant may seem to be opposing characteristics, and yet they exist in a good lubricant; and the quality of an oil depends to a large extent on the degrees in which both qualities are present in the correct proportions.)

(c) The ability to remain sufficiently fluid at low temperatures so that the starting of a cold engine will not be too difficult; and, what is more important, so that the oil in some degree will flow to all bearing surfaces at starting temperatures.

(d) Freedom from acid-forming elements that might attack and injure polished bearing surfaces.

(e) A minimum of carbon-producing elements. It is recognized that the production of carbon in the engine is not due to the character of the oil alone; but the fact that elements in the oil may tend to produce carbon cannot be questioned. More will be said of this later.

The Two-Cycle Engine

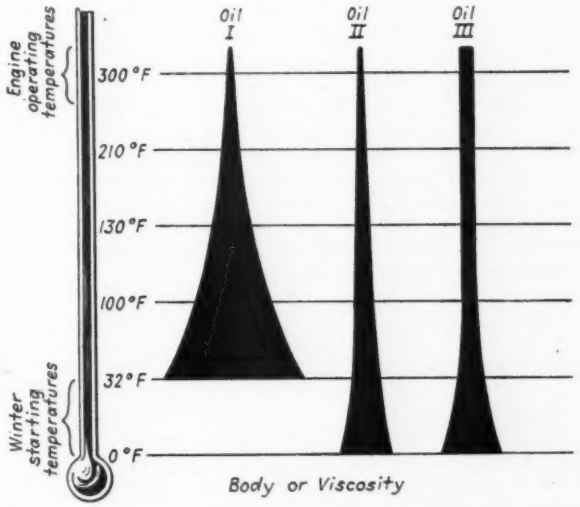
In the two-cycle engine, the oil is mixed with the gasoline, and as the bearings and cylinder walls are constantly in contact with this fuel mixture, their lubrication is automatic. The speed or load may increase or decrease, but as it does there is a corresponding change in the amount of fuel entering the crank case, and a corresponding change in the amount of oil furnished.

The operating temperature of an air-cooled engine is commonly higher than that of a water-cooled engine, and more lubrication is required. The design of the engine is also involved. For these reasons, we find that the recommendations of motor-car manufacturers vary considerably with regard to the grade and quantity of oil to be used. One builder may recommend an oil of grade SAE 60, and specify not less than ½ pint of oil per gallon of gasoline for air-cooled engines and somewhat less for water-cooled engines, while another builder may recommend SAE 30 oil, and specify not less than ½ pint per gallon for water-cooled engines with cast iron pistons, and not less than ¾ pint per gallon for similar engines with aluminum pistons.

These recommendations should not be ignored without substantial reasons; but if cars of both kinds are in use, it would be necessary to carry oils of both grades to follow these instructions exactly. Besides this inconvenience, there is always a chance of error in the selection of an oil for a particular car; and as recommendations as to amount also vary, trouble may result if the wrong oil is used. Errors of this nature are difficult to avoid.

For many years, the usual mixture was in the proportions of 16 parts of gasoline to 1 of oil, amounting to ½ pint of oil per gallon of gasoline, or 62½ gal. of oil for each 1,000 gal. of gasoline. This generally met the recommendations of the motor car manufacturers of 20 years ago, and was satisfactory for the cars of that time. In modern cars, owing to their higher speeds, their slightly higher compression ratios, and other changes in design, such as the use of aluminum or lynite pistons, a larger amount of oil is often recommended, the increase in some cases being more than 50 per cent.

While it is desirable to follow the car-builders' recommendations in detail, and they should be followed if only one builder's cars are used, it will be found satisfactory to use a mixture in which the oil is a compromise in grade, providing suitable adjustment is also made in quantity. One railroad on which cars of several different makes and types are used, mixes the oil and gasoline at the storehouse and



The Widths of the Black Areas in This Chart Show the Body or Viscosity of Three SAE 20 Oils at Various Temperatures

Oil I—Too heavy for easy starting of cold engine, and too light at high temperatures to afford proper protection.

Oil II—Too light at high temperatures.

Oil III — Light enough for easy starting at low temperatures while having sufficient body for protection at high engine temperatures.

*A monograph entitled "The Selection and Use of Light Gas Engine Oils" presented to the American Railway Engineering Association by C. H. R. Howe, cost engineer, Chesapeake & Ohio, gives very practical suggestions regarding the making of service tests of oils. This is found in Vol. 39, pages 632-634, of the association's proceedings. The report on Lubrication of Roadway Machines previously mentioned also covers the subject of field tests.

has demonstrated by several years' successful use that such a compromise will give satisfactory results. The accompanying table shows the grade and amount of oil used in comparison with the recommendations of two motor car manufacturers.

Grade and Amount of Oil Used Compared With Manufacturers' Recommendations

		Recommended A	Recommended B	Used
Manufacturer				
Grade		SAE 60	SAE 30	SAE 40
Pints of oil per 5 gal. of gas	Min.	1¼	2½	3 1/5
	Max.	3	3¾	
Gallons of oil per 1,000 gal. of gas	Min.	43¾	62½	80
	Max.	75	93¾	

It might be thought that, since the oil is mixed with and diluted by the gasoline, an oil of almost any grade can be used if the proportions in the mix are correct. This is true to a limited degree, and is favorable to the successful use of a compromise mixture in cars of different makes. There are, however, two limiting and opposing conditions. The first of these is that sufficient lubrication must be provided. The second is that the burning of the mixture in the cylinder must not produce so much carbon as to interfere seriously with the operation of the engine. A rather small amount of the oil in the mixture finds its way into, and lubricates, the engine bearings, or settles on the cylinder walls and lubricates them for the movement of the piston. By far the larger amount is burned or partially burned with the gasoline, or thrown off with the burned gases.

Effects of Carbon in Engine

The burning of the oil produces carbon, the amount and nature of which varies with the character of the oil and the quantity burned. This carbon, deposited on various parts of the engine, is responsible for many troubles. It may take the form of a hard varnish-like substance on the cylinder walls and piston, and so reduce the clearance between them as to cause over-heating or sticking. It may gather in the ring grooves and "freeze" the piston rings so that compression is lost. It may form an insulating blanket on the inside of the cylinder head and interfere with the cooling of the engine. It may gather on the spark plug porcelain and terminals and short the ignition current so that the engine does not fire; or, on the other hand, it may gather on the head of the piston in such quantity and become so hot as to cause pre-ignition. It may collect on the inside of the piston head as well as on top, and so hold the heat as to burn through the piston head, or it may gather in the ports and interfere with the exhaust of the burned gases, and thus prevent the charge of fresh fuel from entering the cylinder.

Since many of the troubles met with in the operation of two-cycle engines are due to carbon, it is well to consider the relation of the oil used to the carbon produced. If there is more oil in the fuel mixture than is required for lubrication, an unnecessary amount of carbon will be formed, hence, only enough oil should be used as is required for lubrication. This would seem to argue for the use of a heavier oil, of which a smaller amount is required. However, with the same amounts of two similar oils, that differ only in grade, the heavier oil will commonly produce the greater amount of carbon.

In oil analysis and specifications the Conradson Carbon Residue is frequently given. As between two oils of different quality and make, this is not a dependable measure of the amount of carbon that will be produced, since many conditions other than the oil may be involved in the production of carbon; yet there is a general agreement between the Conradson index and the amount of carbon resulting from the use of the oil in an engine. Examination of an oil manufacturer's specifications for a given brand or quality of oil shows a rapid rise of the Conradson index as the SAE number increases.

Consideration of the undesirable effects of carbon, therefore, suggests that best results will be obtained by the use of the least amount of the lightest oil that will provide satisfactory lubrication. However, if the amount of oil used is too small or if the oil is too light in grade, inadequate lubrication will result.

The oil and gasoline must be thoroughly mixed. Just as a continual flow of fuel is required for power, so a continual supply of oil is needed for lubrication. If the oil and gasoline are not well-mixed, the flow of oil will not keep step with the flow of fuel, with the result that, at one time there may be insufficient oil and the parts will not be well lubricated; while at another time there will be too much oil, resulting in clogged fuel lines, ignition failures or undue carbon production.

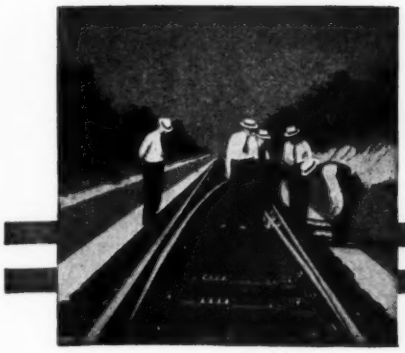
The mixing may be done either in the field or at a central point. Where many cars with two-cycle engines are used, the latter method has several advantages. It insures a more uniform mixture if the proportioning is done carefully, and the mixing is thorough. Since the mixture is unsuitable for use in four-cycle automobile or tractor engines, it discourages pilferage.

The amount of oil necessary to meet the requirements of different engines cannot be varied as conveniently where a pre-mix is used as where the mixing is done in the field. Such a condition can be met, however, and the advantages of pre-mixing retained, by adding more oil at the tool house if a particular make of engine is found to require it.

Another condition affecting the advantages of pre-mixing is the proportion of four-cycle engines used. If the number of such engines is large compared to the number of two-cycle engines, the advantages of pre-mixing may disappear.

Many methods of mixing in the field are used. Perhaps the simplest and safest is to add the required amount of oil to one-fourth or one-third of the gasoline and stir well with a clean wooden paddle before adding the remainder of the gasoline. The mixture should be stirred well again after the remainder of the gasoline has been put in. Boxing the mixture or pouring it from one can to another is also effective. It should be remembered, however, that violent agitation of the mixture by boxing or by shaking the can, may generate static electricity in the can, and, unless this static pressure is relieved, a spark may occur when the spout of the can is brought near the filler opening of the tank. This hazard is usually overcome if the can is set on the ground, especially if the ground is moist, before the fuel is poured into the tank. In any case, the can should be touched to some metal part of the car to relieve the static pressure before starting the flow of fuel into the tank. As the oil is heavier than the gasoline, the mixing will be difficult if the oil is put into the mixing can first, and the gasoline added. It is difficult to mix the two effectively in the fuel tank of the car.

In mixing oil and gasoline at a central point, the adding of the required amount of oil to 50 gallons of gasoline in a shipping drum, and stirring the mixture well is usually satisfactory. The oil should be poured in slowly, and the stirring continued as it is added to prevent its settling to the bottom of the drum. The subsequent handling of the drum in shipping assists in thorough mixing.



What's the ANSWER?

Oversized Crossties

Are there any advantages in the use of oversized crossties? Undersized ties? Any disadvantages? Why? Does the volume of traffic or kind of ballast make any difference?

There Is a Limit

By R. J. Baucom
Engineering Department, Missouri Pacific, Jefferson City, Mo.

Oversized ties may be wider, deeper or longer than the standard, while conversely an undersized tie may have dimensions that are smaller than the standard for any or all of the foregoing measurements. So far as my observation goes, ties that grade as 4 or 5, adzed and bored prior to treatment, hewn or sawn, give excellent service and from this point of view do not need to be oversized with respect to either width or depth.

When using a tie plate 8 in. wide it is certainly of importance that no tie be less in width than the tie plate. In fact, the 9-in. width called for as the standard for the Grade 5 tie is none too much. Using an undersized tie, that is, one less than 8 in. wide, would be likely to have a dire effect on the holding power of the spikes. If the spikes are driven too close to the edge of the tie it will be likely to split a tie of insufficient width, that is, a tie smaller than the tie plate will fail to give the plate sufficient bearing, confirming the assumption that the tie should be as wide, and preferably some wider, than the tie plate.

There is a limit, however, to the practical width of a tie, since it must not be large enough to interfere with the tamping operation by closing up the interval between adjacent ties, or by presenting so wide a base that the tamping tool is unable to pack the ballast all of the way across when it is being tamped. If the ballast is not packed under the full width of the tie, it is almost invariable that the track will start pumping after a short period of time.

In general, the depth of the tie will depend largely upon the timber from which it is made. For the hardwoods, seven inch gives sufficient strength to support present equipment, and it is doubtful whether any greater depth will be necessary, even though heavier wheel loads may be developed in the future.

The use of particular sizes and kinds of ties has been determined primarily by the density of traffic, and to some extent by train speeds, as well as the necessity for using specific kinds of ballast that may be available in the various sections of the country through which the railway runs. However, these matters having been settled and ties of standard dimensions having been adopted, there is no need that I can see for using either oversized or undersized ties, for the reasons that have been stated.

Finds No Advantages

By G. S. Crites
Division Engineer, Baltimore & Ohio, Baltimore, Md.

There are no advantages in the use of oversized crossties, unless in some particular cases where it becomes desirable to have all of the crossties uniformly oversized. Before rigid specifications for the production of crossties were undertaken by the American Railway Engineering Association and adopted by individual roads, it was a wide practice for foremen to select oversized ties for joints and other special places. This was a mistake, for the oversized ties necessitated undue disturbance of the ballast and destruction of the old tie bed to get them into the tracks. Usually, the biggest ties were selected for the joints and the unusual depressions that were necessary in the old tie bed caused the joints to collect water and to pump.

Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

To Be Answered In February

1. *To what extent have higher train speeds increased the importance of track inspection? The frequency of inspection? What items are most affected?*
2. *What are the relative merits of creosoted pile heads and small concrete piers when used as foundation for small frame stations? Sections cut from second-hand creosoted piles? What precautions should be observed?*
3. *What can the regular track forces do to extend the life of switches, frogs and crossings?*
4. *What is the minimum fill that should be allowed over a pipe culvert? Why? Does the diameter of the pipe, the kind of pipe or the character of the filling material make any difference?*
5. *Where washed gravel is used as ballast, what percentage of sand should be incorporated and what should be the maximum size of the pebbles? Why?*
6. *To what extent can pumps and other water-service equipment and supplies be standardized? What are the advantages? The disadvantages?*
7. *What can the section forces do to reduce the rate and amount of rusting that occurs on rail and track fastenings?*
8. *What can be done to avoid a slippery finish on concrete platforms? On concrete floors? Are special finishing materials necessary? If so, what?*

The volume of traffic definitely became a factor in connection with the uniform size of ties that it might be economical to use. Under heavy traffic the ties should be uniform and of larger size, with probably more ties to a rail, than is necessary under light traffic. However, the ties should also be uniform in size under light traffic, since uniformity calls for minimum disturbance of the ballast when making renewals.

There are no advantages in different uniform-sized ties in different kinds of ballast. It is assumed that the volume and character of the traffic will govern both the size of the ties and the character of the ballast that will be economical under the varying traffic conditions encountered.

Much Better if Uniform

By C. D. Turley
Engineer of Ties and Treatment, Illinois Central, Chicago

Obviously, the primary function of a crosstie is to provide a support for the wheel loads of passing locomotives and cars and, in connection with the track spikes, to hold the rails to gage. It is also obvious that oversized ties will increase and undersized ties will decrease the total track support, since tie spacing is ordinarily designated in inches, center to center of the ties.

When an oversized tie replaces a standard tie, especially when the ties are being spotted in, additional labor is required and the old tie bed must be disturbed. When undersized ties replace standard ties, new material must be applied on the old bed. In either case the support is not uniform and the results are not as satisfactory as when ties are replaced with ties of the same (standard) dimensions, and the disturbance of the old bed is held to the minimum.

The ballast that provides the better track support and drainage is of course, preferable, but I do not believe that a small variation in the size of the ties would make it a major factor in determining the answer to the other phases of the question. It is reasonable to assume that, if all of the factors involved were identical, the maintenance requirements for the track would be in almost direct proportion to the amount of traffic.

When Retiring Power Machines

What consideration should govern the retirement of power machines? Power tools? To what extent should obsolescence be taken into account?

There Are Two Classes

By C. H. R. Howe
Cost Accountant, Chesapeake & Ohio, Richmond, Va.

There are two classes of maintenance-of-way work equipment, the productive and the non-productive, and a wide range of reasons for retirals. An excellent example of the non-productive type of machine is the track motor car. It is in actual running service for only a short time or distance each day, and any time that might be saved by replacing it with a faster car would be negligible. If it becomes necessary to increase the carrying capacity, it can be replaced by a larger car, and the smaller car can be transferred elsewhere or to other service.

Retirement may be justified when it can be shown that the cost of overhauling any machine, spread over its probable remaining life, will exceed materially the carrying charges of a new machine. For instance, take a machine that is now 15 years old, with an original value of $300, that requires an overhauling that is estimated to cost $200. If repaired, it will probably last another five years. Assuming that this machine can be replaced in kind at the original price of $300 and that the average life of new machines of this type is 15 years, the annual carrying charge for the new machine will be $20. Compare this with the carrying charge for the old machine, $40 a year during its extended life; the saving of $20 a year is equivalent to a return of 13 1/3 per cent on the $300 that is invested in the new machine.

Obviously, any material salvaged from the old machine will reduce the investment cost and increase the rate of return. In the event that the new machine is an improved design that can be operated at a lower cost than the old one or can be maintained for less, there will be a further return on the investment.

Obsolescence, to use the word in the specific sense that refers to equipment that is outmoded in some manner not necessarily related to physical condition, may be an important factor in considering retirement. In this sense, obsolescence is usually the result of development of improvements in type, design or style of a machine which makes it capable of greater efficiency or of increased production capacity.

If, after adjustments have been made for any difference in the purchase prices of the old and new machines, together with a comparison of operating costs, it can be shown that the reduced operating costs, or the increased productive capacity, will result in saving money, the amount that can be saved should determine whether the replacement is justified.

Obsolescence Is Important

By Engineer Maintenance of Way

There is a large number and wide range of reasons why a power machine or a power tool that is being used in railway maintenance should be retired. In the first place any machine or tool that is worn beyond the ability of the repair forces to maintain it in safe operating condition—and there are more such machines in service than many of us are aware—should be retired without reference to carrying, operating or maintenance costs. This should be an essential consideration that takes precedence over all others.

Power machines and tools are used much more intensively by the railways than the same or similar equipment is in other applications. This does not mean that railway equipment is misused or abused in comparison with that used for other purposes. The reason is that a great deal of the railway equipment is used in connection with large gangs, and it must, therefore, be used continuously and intensively to avoid loss of time by those forces, that would soon equal or exceed the cost of the machine. As a consequence, the life of power machines and tools employed by the railways is about the same as that of similar equipment employed by contractors on large projects.

When a machine is worn to the point where either maintenance or operating cost, or both, are taking an upward trend, the retirement of the machine should be given consideration. Every machine, as it comes from the manufacturer has a certain potential service life and a normal rate for its operation and maintenance. Experience has shown what this potential service life should be, and records should be kept of the operating and maintenance costs.

These records should be watched closely and whenever the carrying charges, together with the operation and maintenance of any unit, begin

to exceed the same costs for a new machine, based on the annual charges, the unit should be retired. It should not be overlooked in this connection that many of the newer designs also exhibit economies in both operation and maintenance, compared with the older models, and this should be given due weight.

Obsolescence is an important factor in the performance of power machines and power tools, as they are used by the railways, which should never be ignored, but should be given full consideration when studying the factors leading to retirement. As defined in the dictionary and as it should be applied to power machines and tools, obsolescence presents two quite different conceptions. The dictionary defines it as the state of being worn out or of having fallen into disuse. As applied to railway work equipment, it is defined correctly as meaning that the equipment is outmoded, out of date or as being superseded by better designs. These later models may do the work better, at less cost, or have greater productive capacity; they may be easier to operate or more responsive to control or may be so improved in other ways that it becomes a financial or operating advantage to retire the old machine and replace it with the newer one. In any event, obsolescence is of enough importance so that it should never be ignored when considering the retirement of any equipment.

Ventilators in Winter

What troubles should be guarded against in the operation and maintenance of ventilators during the winter? Why? Does the character of the building or its use make any difference?

Many Different Types

By A. D. McCloy
Supervisor of Bridges and Buildings, Pere Marquette, Saginaw, Mich.

There are many different types of buildings on a railway for as wide a variety of purposes, and each type presents its own problems with respect to ventilation. Enginehouses and shop buildings are in a class by themselves in any consideration of ventilation from the installation to both operation and maintenance of the equipment. Smoke jacks are provided for the removal of locomotive fumes and gases, but with the greatest care in both design and installation they are frequently quite unsatisfactory, and I have never seen one that could be given a rating of 100 per cent. For this reason we have a continuing coal-gas problem in enginehouses.

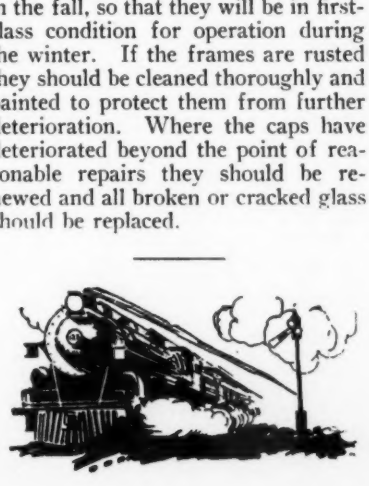
Some enginehouses are of the low-roof type with the louvre huts on the roof, along with the smoke jacks. They do a very good job of ventilating. Other enginehouses have the cupola type of roof, which have the pivot sash on the inside and on the outside of the circle. In the winter it is too cold in the house when the pivot sash are opened, while the house fills up with coal gas when they are closed, so that roof ventilators or a blower system become necessary to remove the gas.

Economy is the watchword in all heating and ventilating systems, and the problem is to get good ventilation without the loss of heat. The blower system has been a decided improvement in ventilating, while the wall fan forces air and circulates it without the loss of heat in the building. It is toward this objective that every precaution should be directed. In other classes of buildings, also, the most careful precautions should be directed to getting the maximum amount of ventilation with minimum loss of heat from the building.

Must Be Kept in Repair

By L. G. Byrd
Supervisor of Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

Irrespective of the character of the building or its use, all ventilators should be inspected carefully and necessary repairs should be carried out in the fall, so that they will be in first-class condition for operation during the winter. If the frames are rusted they should be cleaned thoroughly and painted to protect them from further deterioration. Where the caps have deteriorated beyond the point of reasonable repairs they should be renewed and all broken or cracked glass should be replaced.



If the flashing around the ventilators is not kept in repair there are almost certain to be leaks, especially following the melting of snow that has piled up against them. This rarely occurs during the summer or the rainy season, so that extra precautions should be taken to examine the flashing before winter sets in, and make such repairs as may be found necessary. If the ventilators are equipped with dampers they should be examined to determine whether they are in good operating condition, especially whether they can be closed quickly.

There are many types of roof ventilators adapted for use in large shop buildings, which give satisfactory service. In most cases the fastenings for the caps are applied by means of bolts which deteriorate rapidly under the impact of the gas and fumes which are always present around railway shops, enginehouses and power plants. These fastenings and their bolts should be inspected closely in the fall and spring, and bolts should be replaced as required to make the ventilators both storm and water-proof outlets for the air that is to be removed from the building.

Large ventilators designed to be operated mechanically by means of pulleys, shafts or bevel gears, should be checked carefully to insure that chains, pulleys and gears are in good condition and that bearings are lubricated so that they can be operated easily. It is also important to know that the glass is well anchored to the frames to avoid personal injuries by reason of glass falling out.

Should Be No Trouble

By General Building Inspector

In general, there should be no special trouble experienced with either skylights or ventilators during the winter period if the design is suitable for the service the device is to perform, and the installation has been made correctly. All ventilators of the circular or draft-making type that open directly into the building should be provided with dampers that can be operated from the floor, and all monitor sash should be so constructed that snow cannot enter between the sash and the frames.

Among the troubles to be guarded against are structural weakness, lack of provision for expansion and contraction, lack of a suitable exit for gas and condensation that may occur on parts which may drip. These difficulties can be overcome by taking the following precautions: Use solid metal bars of the required shape, and

of such size that the deflection in any member shall not exceed 3/16 in. Bars constructed of sheet metal, either with or without reinforcement, should be avoided. For enginehouses, shops and power plants, all metal parts should be copper, aluminum or protected metal. Never use galvanized sheets or bars, since the galvanized coating will be quickly destroyed by the fumes and gases that contaminate the air so heavily around enginehouses and shops. This leaves the base metal, usually steel, exposed to quick destruction through the action of these same gases.

One of the important precautions to be taken is to see that all ventilators are anchored suitably and firmly. Dampers, to be operated from the floor, should be provided and equipped with an adjusting device, located conveniently, to hold the damper closed half open and a quarter open, so that the desired amount of ventilation can be obtained.

Salvaging Pump Parts

Is it practical to salvage parts from pumps that are to be scrapped? Is it economical? Why? What precautions should be observed?

Not for Centrifugal Pumps

By J. S. Eastman

Special Water Inspector, Chicago, Milwaukee, St. Paul & Pacific, Chicago

Twenty-five to 40 years ago reciprocating pumps were in general use for deep-well and other pumping operations. This equipment was massive, heavy and comparatively expensive as to first cost, but many of these units are still in service today, primarily because of their sturdy construction, their reliability, their relative moderate maintenance costs and their flexibility, within relatively wide limits, to conditions that were encountered.

As these units are retired from service it becomes increasingly important that all of the useable parts be salvaged and reconditioned for use on the similar units that still remain in service. Because little such equipment is now fabricated, and smaller stocks of repair parts are carried by the manufacturers, many repair parts must be made on special order, usually at high cost and with extended delays.

The deep-well turbine and centrifugal pumps which have developed so rapidly during the past quarter century, have little flexibility with respect to head and capacity, since they are usually designated for specific pumping conditions. They are small, light and precision built, compared with the older reciprocating type.

Salvage of the worn parts of the centrifugal pumps without a well-equipped shop and carefully-trained personnel to operate it is of questionable desirability. The pump-operating efficiency is so dependent on the minute details of the design and the precision construction of the impellers, the shafting, the bearings and the housings, that slight variations in size may produce any but desired pumping conditions. For this reason, the salvage of these parts should not be attempted by the average pump operator, and when worn they should be replaced with new parts.

Brings Up Standardization

By A. B. Pierce

Engineer Water Supply, Southern, Washington, D. C.

This question brings up the subject of standardization of pump installations. If a road has set up such a policy, the salvaging of pump parts may have some economic value. This policy is rarely attempted, however, as each installation should be designed to give the most economical power cost.

Even those who have attempted to standardize their pumping stations should use only the working parts of pumps that are to be scrapped, not the heavy pump castings, impeller casings and other parts that do not wear out. It would not be economical, therefore, to use time and labor to repair pumps with old worn parts.

Salvaged parts may be used occasionally to keep a pump in operation until new parts can be obtained. The best policy is to keep on hand a small stock of new working parts for the replacement of those items that require frequent renewal.

In attempting to use salvaged repair parts, it will be necessary to observe certain precautions to insure that the parts to be used are for the identical size and type of pump to be repaired. New parts are ordered by giving the specific number or other designation employed by the manufacturer of the pump in his replacement-parts list.

It would not be practical for a pump repairman to pick out an old salvaged part without knowing whether it were the exact part desired. This is true particularly of impeller parts for centrifugal pumps, which are all designed to operate at a given head and for a specific number of gallons per minute. One mistake in selecting a salvaged major repair part probably would result in destroying a pump.

Widening Cuts for Snow

To what extent is it desirable or economical to widen cuts or flatten the cut slopes to prevent accumulation of snow? How can this best be done?

Is Highly Desirable

By V. E. Glosup

Division Engineer, Chicago, Milwaukee, St. Paul & Pacific, Miles City, Mont.

Cleaning cuts to a distance of 26 ft. from the center of the nearest track is highly desirable. Where particular difficulty is encountered with heavy drifting every winter, it is economical to clean out these cuts by widening them, flattening the slopes, or both, as may be required to insure better and more dependable operation throughout the winter period.

Through the Dakotas and Eastern Montana, which are considered under normal conditions to be semi-arid, we find that vertical or nearly vertical side slopes are more desirable than flat slopes. The flatter slopes do not offer as much protection from drifting snow as the vertical slopes, and because of the peculiarities of the soil, and wind and weather erosion, they require more cleaning than the vertical slopes, especially if the toe extends to the side ditches. Vertical slopes through the Dakotas and Eastern Montana, where much of the soil is loess, have remained stable for years with practically no maintenance.

Where cuts are being widened or cleaned to prevent accumulations of snow, consideration should be given to the importance of the particular locations, the usual depth of the snow deposited and its effect upon train oper-

ation as known from past experience. The most satisfactory method of disposing of the waste material should be determined, using it to advantage where possible to improve adjacent fills or for restoration and stability. Under normal conditions cuts can be widened economically to 2½ times their heights, measuring from the center line of the nearest or outside track, thus providing a vertical back face (slope), where soil conditions permit, up to a distance of not more than 50 ft. from the center line of the track.

Widening a cut provides a wide open area through which wind is effective in driving snow through the cut for deposit elsewhere. It also provides space for the collection of snow without obstructing the track, gives snow-fighting equipment a better opportunity to work, and improves drainage, so that water from melting snow can get away rapidly.

Two Aspects to Problem

By District Engineer

There are two aspects to the problem presented in the question. The first is the importance of the line with respect to traffic density, the amount and frequency of the interference with traffic, which means, in effect, the time lost in the movement of trains under existing conditions. This phase also includes thorough consideration of the railway's obligation as a common carrier to keep its traffic routes open. The second phase includes a comparison of the amount that must be spent now and after the cut has been widened, or the slopes flattened, to keep this part of the traffic lane open for the free movement of trains.

Any one who has spent considerable time in a heavy snow country, especially if he has had any responsibility for keeping the line open, knows from experience the serious delays that can occur during heavy snow storms and the difficulties that must be overcome to keep traffic moving. He also knows how, after the first snow has accumulated in the cut, these difficulties recur and grow with only moderate snowfalls that may occur from time to time.

Obviously, as the volume of traffic on a given line increases, the importance of keeping the traffic moving without delay or interruption increases at an even higher ratio. In other words, where it might be the reverse of economy to spend the money that would be required to keep open an unimportant branch line that has only one or two trains each way a day, it would be a serious error in judgment to apply the same procedure to a busy line that handles, say 100 or more trains a day.

As a general practice, I would not attempt to flatten the slopes of deep cuts, although there may be special cases where this can be done to advantage. I would flatten the slopes of the shallower cuts to an angle of about 30 deg., at the same time setting the foot of the side slopes back several feet from what is required for the normal roadbed section. This may seem to be an unnecessarily flat slope, but it should be remembered that most slide slopes have an angle of 45 deg., and that we are trying to correct an undesirable condition and allow the wind to carry the drifting snow out of and beyond the cut instead of depositing it where it will interfere with train movements.

Deep cuts should be widened. How much? This will depend on many factors, including the depth of the cut, the kind of soil, the direction of the axis of the cut with relation to the prevailing winter winds, the probable depth of snowfall and the situation regarding drainage. There may also be important local factors to be taken into account. In any event, a good rule to follow is to get enough width to contain all of the snow that is likely to enter the cut, and to arrange for dependable drainage. The latter may save much trouble and concern in the event of a quick thaw, especially if accompanied by rain.

It should not be lost sight of that it is always better to prevent snow reaching the track in such volume as to interfere with trains than it is to undertake to remove it after interference has started. It is also well to keep in mind that widening cuts or flattening side slopes is only one means for reducing the snow menace in country of heavy snowfall and frequent storms.

Anti-Creepers on Open Decks

Is it permissible to apply anti-creepers on open-deck trestles? On steel bridges? Does the length of the trestle or of the span make any difference? Why? How many should be applied? How can the ties be held in the place?

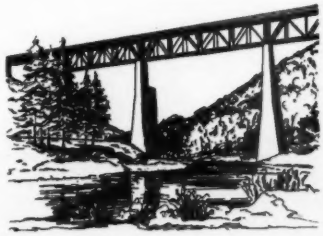
Is Applying Them

By L. G. Byrd
Supervisor of Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

On those roads that I have had an opportunity to observe, I have noted that the ties are anchored to the stringers by boring holes through the tie with a ½-in. auger and into the stringers with a ⅜-in. auger. Boat spikes, ½ in. by 12 in., are then driven in these holes through the tie and into the stringer, to anchor the ties and hold the track in line. The spacing is one on every fourth tie on tangents and on alternate ties on curves.

Some roads use key ties over the stringers to hold the track in line. In overflow districts, anchor bolts are placed through the center of the tie and down through the cap to prevent the deck from floating away.

It is the general practice to groove the ties to accommodate the rivet heads and to anchor the ties by means of hook bolts through every fourth tie on tangents and through alternate ties on curves. These methods are not sufficient, however, to hold the rail in place and, in an effort to eliminate the tendency to creep, anti-creepers may be, and often are, applied to every anchored tie in the open deck.



We have a large number of open-deck trestles and steel spans where various types of anti-creepers have been applied. They have not been satisfactory, however, because they have not prevented the rails from running and as a consequence there has been some damage to the structures.

On steel spans, where cover plates have been applied to protect against brine drippings, these plates have been torn loose, after having been welded at each end, by the running rail. This has caused the track to become out of line, in addition to serious damage to the ties and guard timbers.

Based on my experience, and considering the increase in maintenance requirements, I believe that it should not be permissible to apply anti-creepers on either long or short open-deck timber trestles, or on steel spans. Enough anti-creepers to hold the rail from running can be applied on the track for some distance leading up to

the bridge. If the bridge be a long one, either timber trestle or steel spans, I would recommend butt-welding the joints on the bridges and the application of the anti-creepers on the approaches to the structure. A well-ballasted roadbed will exert more resistance to rail movement than any structure can be expected to do.

On some of our subdivisions the roadmasters do not apply anti-creepers on their bridges and they have no trouble with running rail, provided they apply them on the earth-supported track approaching the structures. Others apply them on all bridges regardless of length. The result is that bridge maintenance has increased materially. If it seems necessary to apply anti-creepers to open decks, then a better method than the present one should be devised for holding the ties in place.

Ties Must Be Anchored

By Assistant Engineer of Bridges

It is not customary to place anti-creepers on open-track trestles, because it is difficult to keep the ties against which the anti-creepers bear from twisting around or moving otherwise. Anti-creepers can be used on both open-deck trestles and steel bridges, provided care is exercised to place them against ties that are anchored against longitudinal movement.

It is the usual practice on the road with which I am connected, to weld electrically short pieces of steel angles to the stringers of steel spans. These angle stoppers are welded to two of the stringers, so that the upstanding legs of the angles will bear against the side of the tie. These clip angles are placed so that they will prevent movement in either longitudinal direction although the same tie is not anchored in both directions.

Another method for anchoring ties firmly to the steel is to burn holes in the top flanges of the stringers, then bolting the tie to the stringer and to the timber guard rails. Both the welding of the clip angles and the burning of the holes can be done either in the shop or in the field.

Where steel floor-beam and stringer construction is employed, it is customary for the stringer tops to be from four to six inches below the tops of the floor beams. For such construction it is our practice to place ties butting against the side of the floor-beam flanges. These ties adjacent to the floor beams can then also be used to place anti-creepers against. It has also been our practice to place the anchored ties from four to six feet apart, depending on the type of bridge and its location.

Assignments in Extra Gangs

Is it feasible to assign men in extra gangs to certain kinds of work permanently? How should they be selected? What are the advantages? The disadvantages?

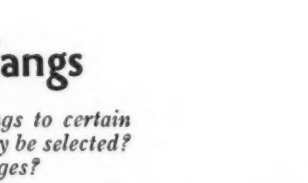
Assign Them Regularly

By F. M. Harris
Roadmaster, Missouri Pacific, Arkansas City, Kan.

In any well-organized extra gang the men composing the gang must perform duties under three categories, namely, an individual working alone; two men working as a pair; and in groups. The first category includes flagmen and machine repairmen who maintain the power equipment and tools used by the gang, so that they will always be ready for service. Other examples are a man to care for track tools and another to keep the gang supplied with water.

Obviously a man or men should be assigned regularly to the jobs mentioned, when it requires a full day to perform the duty. However, this will depend in some measure on the size of the gang. In a small extra gang a man can be assigned to perform two or more jobs, depending on how much time is required for each. As an example, where flagmen are not required continuously, they can be assigned to perform additional duties when not flagging.

When assigning men to work alone, only those who are most intelligent and alert should be selected. When the individual fails to function in his regular assignment, he should be changed immediately to other work in categories two or three, for the men who are assigned as individuals should always be the key men in the gang.



When working in pairs, such as putting in ties, spiking, tamping or any other work requiring the services of two men to perform, these men should be able to get along well together. The spikers should be able to strike either right or left hand, or both.

In any group performing such work as lining track, handling rail with tongs or other tasks requiring the services of more than two men, one should always be selected as the leader of the group.

The objective of any gang should be to do the job safely, effectively and economically. In the attainment of this objective, the results will depend in large measure how the gang is organized. If well organized, this objective will be attained without loss of time from confusion. In the well-organized gang, the men know at all times exactly what they are expected to do, and they also know how and why it is to be done.

One of the important advantages of assigning men to certain tasks is that it eliminates confusion, enabling the men to work more effectively, because they know what is expected of them as well as how and why the task is performed. Furthermore, the foreman or the supervisor become aware of each man's capabilities and the extent of his reliability. Last but not least the morale of the men is maintained at a high level, because they appreciate the fact that they have an important part in the work of the gang.

Favors the Practice

By R. A. Whiteford
Division Engineer, Chicago, Milwaukee, St. Paul & Pacific, Marion, Iowa

I consider it not only feasible but highly practicable and desirable to assign men in extra gangs to certain kinds of work permanently. As an example, take the organization of a rail gang. When starting a gang to work, the foreman usually has all of the spikers line up and, if he needs 20 men, he picks from this group those who claim to be spikers, and tries them. It requires only a short period for the foreman to determine whether a man is a spiker.

In selecting men to operate spike pullers, adzing machines, spiking machines, etc., if the foreman is not acquainted with any of his men, he will find it necessary to use his best judgment and, if some of them prove to be unsatisfactory, he will have to shift these men to some other job which they will be able to handle.

By having a man perform the same task day after day, he will become proficient in his work and one will

have formed a smooth-running organization. Each laborer will become a well-trained employee, who will be much more likely to do his work safely than if he were shifted from job to job with no effort at system. Furthermore, not only the individual, but the gang as a whole will achieve maximum production. This will lower the unit cost of the work, which is one of the objectives for which we must all strive at present.

If the men are not assigned to the same job day after day the foreman will be burdened with the necessity of continually breaking in new men, and he will never attain a smooth-working organization. As a result the cost of the work will be increased.

One Disadvantage

By R. L. Baucom
Assistant Engineer, Missouri Pacific, Jefferson City, Mo.

In the employment of extra gangs it is of urgent importance that they be well organized. To reach the highest level of effectiveness a well-organized gang is one in which every man has an assignment to perform a certain unit of the work, whatever the work of the gang as a whole.

The duty and responsibility of making these assignments fall directly upon the shoulders of the foreman. If he is alert and is possessed of good judgment, it should take him only a short time to find out the capabilities of the men selected for these assignments. And if he explains the duties of each man so that they are well understood, then all can work together with an ease and speed that will soon produce a greater amount of work of better quality.

There is one disadvantage in the regular assignment of men to certain tasks permanently which arises out of the high rate of turnover in extra-gang personnel, particularly at present. Extra gangs are generally composed of transients, many of whom may decide at any time to move on for one reason or another, and often for no apparent reason, necessitating the assignment of another man and a certain period of training. This problem is not always difficult, however, because some of the other men in the gang may be qualified to step into the place thus vacated, with the minimum of training.

Aluminum in Buildings

To what extent can aluminum be used in the construction and modernization of railway buildings? For what purposes? What are the advantages?

Depends on Cost

By H. C. Lorenz
Assistant Engineer, New York Central, Cincinnati, Ohio

In general, the extent to which aluminum will be used in railway buildings of the future will depend in large measure upon the comparative cost of the aluminum and of other building materials, due consideration being given to its inherent superiority for a given purpose. Because of its lightness, its low maintenance cost, its freedom from shrinkage and warping, it will be used in doors, windows, screens and for other similar purposes, as well as for decorative work in office buildings and stations. Since it does not require painting it will be employed for skylights, flashing, gutters, downspouts, roofing and, perhaps, building siding.

As a standard material it may prove to be economical for use in enginehouse trusses, because of its resistance to sulphurous acid or smoke. However, I believe that this latter claim is more or less speculative, since its resistance to smoke of the density encountered in enginehouses has not been established fully. Because of its resistance to rust or corrosion, it may also be employed for water tanks.

Has Many Uses

By General Inspector of Buildings

I am more or less an enthusiast on the subject of using modern building materials, so far as they have been proven, for both original construction and the modernization of buildings that still have many prospective years of service so far as physical fitness is concerned, yet that are so completely out of date with respect to appearance and arrangement, as well as to appointments, that they have become liabilities rather than assets.

Many of these buildings represent investments of considerable value, that can be salvaged through modernization, but which would be lost through replacement. Often these old buildings can be made as attractive through a well-thought-out plan for modernization as any new structures that might be designed to replace them. Aluminum can be given a large part in carrying out such a scheme of modernization, for it lends itself to a wide variety of applications, ranging from exterior protective purposes to interior decorative purposes.

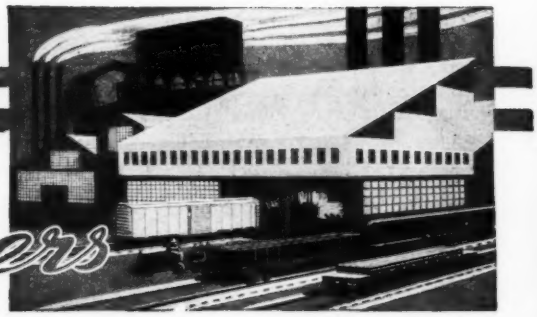
Among the exterior applications are such items as shingles, siding, downspouts and gutters, to name only those which are already available. Other similar applications probably will be developed in the future. Obviously, aluminum should lend itself to the making of such items as window and door frames, sash transoms, window and door screens, and doors. Because of its light weight it should find considerable favor in the latter application. Again, also because of its light weight and its immunity from corrosion, wherefore it need not be painted, it appears to be an ideal material for the construction of skylights.

Since the use of aluminum in building work is so new, many of its possibilities have not been developed as yet, so that any present discussion of the subject is likely to be partly speculative. On the other hand, since it is so well fitted inherently for many purposes, its use for these purposes can be predicted with more or less certainty. One of these is for interior decorative purposes, of which there are many forms. As I see the matter, the interior applications will probably precede most of those that have been mentioned, but I can foresee an early and widespread use for many of the other purposes.

What about structural uses? A recent article in this magazine recorded the use of aluminum trusses in an enginehouse. How successful it will be only time will tell. I would rather reserve my comments on this and similar applications until experience gives us some clue as to what the ultimate results will be in this service.

New Rail Designs—Three new rail sections have been adopted recently by the American Railway Engineering Association—115-lb. RE, 132-lb. RE and 133-lb. RE, to replace the present 112-lb. RE and 131-lb. RE sections. Developed with the aid of advanced techniques in rail study, the new designs are based on both field and laboratory investigations carried out by the research staff of the A. A. R.'s Engineering division and the Pennsylvania's test department. The idea of having two new sections to replace the existing 131-lb. section breaks precedent; but the 133-lb. section is expected to meet the requirements of roads which desire a deeper head than that of the new 132-lb. section for their heavy-traffic lines.

PRODUCTS of Manufacturers



Air King Compressors

A NEW line of air compressors, designed for use with electric motors of standard horse-power ratings, has been announced by Worthington Pump & Machinery Corporation, Harrison, N. J. Known as the Air King line, it includes single-stage and two-stage units, with pressure capacities up to 250 p.s.i., to be mated to standard motors of 1 to 15 hp., inclusive. The compressors are available as self-contained, power-driven models, mounted on bases or tanks, or as bare compressors arranged for direct or V-belt connection to separate driving motors. The units are suitable for a variety of industrial uses, such as paint spraying, and operating pneumatic controls, tools and devices.

A feature of the new compressors is an automatic, centrifugal-clutch starting mechanism, which is said to permit the driving motor to attain its full speed before the compressor starts to turn, eliminating the need for starting unloaders, check valves, and release and bleeder valves. This feature, it is claimed, will also eliminate transmission losses and drive adjustments, and permit a neat, compact appearance. All moving parts are enclosed with an adequate safety guard.

Complete descriptive literature regarding the Air King line is available in Bulletins H-620-B26 and H-620-M13, copies of which may be obtained on application to the manufacturer.

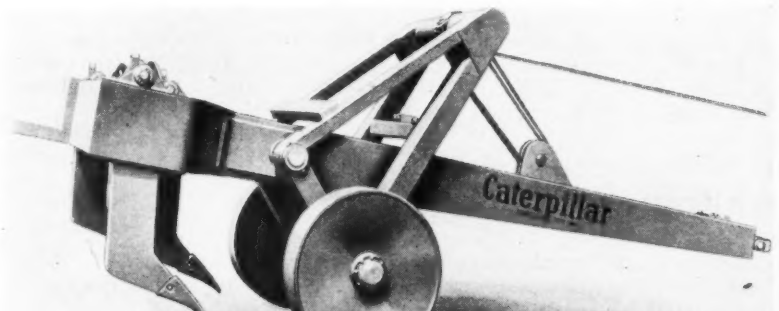
One of the Worthington Air King Self-Contained Compressor Units Mounted on a Tank

Caterpillar Rippers

PRODUCTION of two sizes of cable-operated rippers, ruggedly designed for heavy work, has been announced by the Caterpillar Tractor Company, Peoria 8, Ill. These units, known as No. 18 and 28, are said to speed up scraper loading substantially and, at the same time, to minimize wear and tear on scraper cutting edges and bowls. Each model is mounted on two wheels of the steel-drum type and is equipped with three detachable teeth having replaceable tips of heat-treated alloy steel. The tooth angle and weight distribution are designed for penetration of the hardest material.

The No. 18 ripper is built for use with a single D7 or D8 tractor, while the No. 28 model is intended for use with one or two D8 tractors. The units are operated by rear cable controls on the tractor, using sheaves 9¾ in. in diameter.

The approximate shipping weights of the No. 18 and the No. 28 rippers are 9,500 lb. and 13,000 lb., respectively. If desired, the principal frame member of each model can be filled with sand or other material to increase the operating weight approximately 2200 lb.

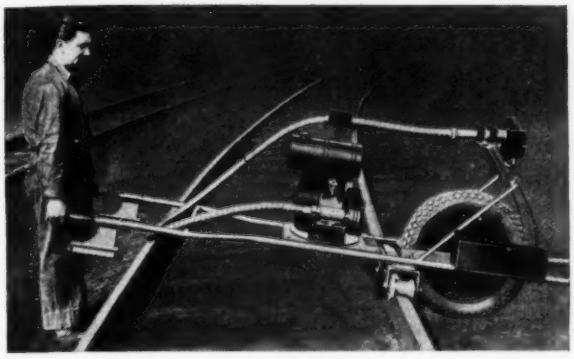


One of the New Caterpillar Rippers

Wheelbarrow-Type Portable Grinder

THE introduction of a new rubber tire - mounted, wheelbarrow - type, flexible-shaft track grinder, for free-hand grinding of rail ends, crossings, frogs, switch points, and stock rails, known as Model P-40, has been announced by the Railway Track-Work Company, 3207 Kensington

avenue, Philadelphia, Pa. This unit is fitted with two sets of rollers in the lifting handles, one of them with flanges, so that the machine may be mounted on and moved along the track in addition to being used as an off-track unit. The grinding shaft is 10 ft. long.



The P-40 Portable Flexible-Shaft Grinder

The grinder is powered by a six-horsepower, air-cooled, gasoline engine mounted on a ball-bearing swivel plate, so that the grinding shaft and attachments may be easily positioned with respect to the work. A locking device prevents the power unit from swiveling while the machine is being moved. The engine has an adjustable governor by which, it is said, the operator may obtain the most suitable operating speeds for the various types of grinding wheels, and the governor is also said to prevent the operation of the machine at speeds exceeding 9500 surface-feet per minute.

The main transporting wheel has a three-position setting. In one setting the unit may be handled along the track with ample clearance at switches, frogs and road crossings, while a second position facilitates moving the machine to and from the track. In the third position the grinder is leveled for off-track operation.

The unit will operate several auxiliary attachments, including a straight-wheel hand piece, a cross-grinding guide, and a track drill. It is also available in models powered by an electric motor.

Small Crawler Tractor

THE Allis-Chalmers Manufacturing Company, Tractor division, Milwaukee 1, Wis., has introduced a 37-hp. crawler-type tractor, designated as Model HD-5, which is said to be engineered completely new throughout in accordance with the needs of users, as expressed by contractors, operators and maintenance men. Among the outstanding features incorporated in the new model are fewer adjusting and greasing points; an A-frame track stabilizer, designed to absorb shock, to eliminate twisting strains, and to provide rigid alinement of the tracks; a cushion seat, with arm rests that serve as auxiliary seats, which, along with accessible controls and a convenient gear-shifting arrangement, is said to reduce operator fatigue; five speeds forward, ranging from 1.46 m.p.h. to 5.47 m.p.h.; and a choice of either 44-in. or 60-in. track gages, both having 5 ft. 4 in. of each tread in contact with the ground. Truck wheels, idlers, and support rollers are grease-packed at the factory, and are said to require servicing only once every 1000 hr. of operation.

The tractor is powered by a General Motors two-cycle Diesel engine with unit injection and four-way cooling. Parts are interchangeable with other Allis-Chalmers "71" series tractors. A variety of accessory equipment can be obtained for use with the HD-5, such as a new hydraulic Tracto-Shovel, manufactured by the Tractomotive Corporation, Findlay, Ohio. The Baker Manufacturing Company, Springfield, Ill., and Gar Wood Industries, Inc., Detroit, Mich., have designed straight and angle bulldozers for the new tractor; while a Carco winch, a Gar Wood two-wheel scraper and a Drott skid loader (Hi-Way Service Corporation, Milwaukee, Wis.) are available. Other accessories include a belt pulley, power take-off, pull hook, engine heater, and hood side plates.

The HD-5 Tractor Equipped with a Baker Angle Dozer

Lightweight Gasoline Engine

D. W. ONAN & Sons, Inc., 43 Royalston avenue, Minneapolis, Minn., has developed a 10-hp., 4-cycle, heavy-duty gasoline engine, having a gross weight of only 97 lb., which is said to represent a complete departure from conventional engine design. An air-cooled engine, the new unit, known as the CK, is claimed to be capable of water-cooled performance and service characteristics.

The engine is built of aluminum for light weight and increased cooling capacity, and has an opposed cylinder arrangement. Each cylinder is designed with more than 340 sq. in. of cooling surface and has an independent cooling area, thus, it is said, eliminating heat radiation from one cylinder to another. An axial flow fan provides 600 cu. ft. of cool air per minute without, it is claimed, absorbing excess engine power.

The CK engine is said to be surprisingly quiet in operation because of the running balance afforded by the opposed cylinder construction. Present output of the CK will be used as prime movers for new Onan electric generating plants, such as

One of the New Onan CK Engines

the 5CK series, lightweight portable plants, weighing 258 lb. complete, and rated at 5000 watts. The engine is also claimed to have advantages for use in rail motor cars and is said to be suitable for operating grinders, spike drivers, tamping equipment, and special track tools of all types.

It is also available with an electric starting motor, which serves as a generator for charging the battery during operation of the engine.

Portable Compressor

A NEW portable 60-cu. ft. air compressor, available with several styles of mountings, has been announced by the Davey Compressor Company, Kent, Ohio, which is to be known as Model 60V. The mountings available for the compressor include standard skids, the two-wheel pneumatic-tired trailer type, and flanged wheels. It is also offered for use on a truck body as an "Auto-Air" compressor, and a Davey heavy-duty power take-off is provided for this style of mounting when desired.

In the skid, trailer and railway models, the power is furnished by a Hercules IXB engine, which operates the compressor at 1225 r.p.m. The compressor unit has a low-pressure cylinder of 5¾-in. bore and 4½-in. stroke, and a high-pressure cylinder with a 3⅝-in. bore. The weight of the compressor in the two-wheel trailer model illustrated is 2100 lbs.

Paint Remover

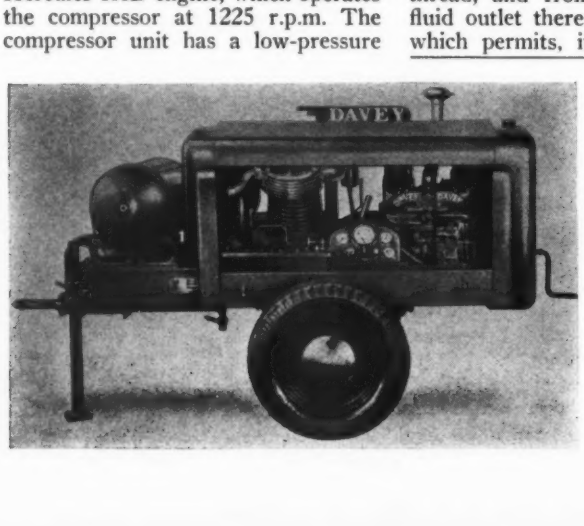
BULL-DOG Remover, said to contain a new, quick-acting solvent for removing tough coats of old paint, varnish, enamel, shellac and lacquer, has been developed by the Gillespie Varnish Company, Dey Street, Jersey City 6, N.J. The solvent is said to act quickly on hard-finish coats, reducing them to a sludge which can be stripped off readily without leaving a greasy film. It is claimed that the remover will remain moist and deep-cutting for 24 hr., even in hot sunlight.

It is claimed that Bulldog Remover has no disagreeable odor, is free from acid and alkali reactions, and is non-corrosive and harmless to persons, brushes, wood grain, and fibers. It is available in both liquid and cream form, the liquid being recommended for furniture, Bakelite varnishes, clear varnishes, clear finishes and on flat surfaces, while the cream is recommended for vertical surfaces and exteriors. This product is supplied in half pints, pints, quarts, and gallons.

Heavy-Duty Spray Gun

A SPRAY gun specifically designed for the application of heavy materials at high speed, has been announced by the Eclipse Air Brush Company, 426 Park Avenue, Newark, N.J. Known as the Eclipse "46", this model is said to handle such materials as roofing compounds, fibrated bitumastics and emulsified asphaltums. The fluid connection is a standard ¾-in. pipe thread, and from this point to the fluid outlet there is a 45-deg. angle, which permits, it is said, an unrestricted flow of material. The fluid valve has a travel of ½ in., with the result, it is claimed, that there can be no obstruction when the gun is wide open in operation.

Eclipse "46" Spray Gun



Davey Compressor Model 60V with Two-Wheel Pneumatic-Tired Trailer Mounting

New Book

Who's Who in Railroading

WHO'S WHO in Railroading in North America. 780 pages. 8¾ in. by 5¾ in. Bound in cloth. Published by the Simmons-Boardman Publishing Corporation, 30 Church street, New York. Price $8.50.

THIS is the eleventh edition to be published of this standard biographical index of leaders in the railway and allied fields.

Prior to 1930 this book was known as the Biographical Directory of Railway Officials in America and included only officials of the railroads. Since that time its coverage has been broadened to include leaders in the railway supply manufacturers' group, railroad labor leaders, regulating authorities—both state and federal—transportation economists, specialists in railway finance, educators concerned with railroad problems, I.C.C. practitioners, consultants, authors, editors, etc. In the current edition, special attention has been given to war-service records, particularly those of men who were commanding officers in the Military Railway Service.

The book contains approximately 5700 biographical sketches which include not only the business careers of those mentioned, but also data regarding family, social, political and religious affiliations.

Changes in Railway Personnel

General

Bernard J. Fallon, former executive officer of the Chicago North Shore & Milwaukee, and an engineer by training and experience, has been elected president.

H. D. Brydone-Jack, acting manager of personnel on the Canadian Pacific, at Montreal, Que., and an engineer by training and experience, has been appointed manager of personnel, with the same headquarters.

Clifford S. Leet, assistant general manager on the Bessemer & Lake Erie, at Pittsburgh, Pa., and an engineer by training and experience, has been appointed assistant to the president, with the same headquarters.

W. E. Smith, vice-president and general manager of the Louisville & Nashville, with headquarters at Louisville, Ky., and formerly track supervisor, roadmaster, and superintendent of construction for the entire system, has retired after 61 years of continuous service with that road.

T. D. Williams, assistant superintendent-chief dispatcher on the Louisville & Nashville, with headquarters at Pensacola, Fla., and an engineer by training and experience, has been advanced to general superintendent, with headquarters at Louisville, Ky.

Dean F. Willey, assistant vice-president in charge of operation, maintenance and engineering of the New York, New Haven & Hartford, at New Haven, Conn., and an engineer by training and experience, has been promoted to vice-president in charge of operation, maintenance and engineering, with the same headquarters.

C. B. Petticrew, superintendent on the St. Louis Southwestern (the Cotton Belt), with headquarters at Pine Bluff, Ark., and an engineer by training and experience, has been promoted to superintendent of transportation, with headquarters at Tyler, Tex. Mr. Petticrew was born on November 21, 1887, at Franklin, Ohio, and was graduated from Purdue University in 1909. He began his railroad career in 1905, while attending college, as a rodman on the Cleveland, Cincinnati, Chicago & St. Louis. From 1909 to 1916 he served with the Missouri Pacific, successively, as rodman, instrumentman, roadmaster and engineer. In 1916 he became district engineer of the Missouri-Kansas & Texas (now the M-K-T), and in 1919 he was made trainmaster. He joined the Cotton Belt in 1920 as division engineer, and in 1923 was advanced to superintendent at Pine Bluff, Ark. He held the latter position until his current promotion.

L. L. Morton, assistant vice-president and assistant general manager (operating, engineering, and roadway), and director of personnel on the Louisville & Nashville, with headquarters at Louisville, Ky., and an engineer by training and experience, has been appointed vice-president in charge of operations, with the same headquarters. Mr. Morton was born on April 2, 1884, at Mt. Eden, Ky., and entered railroad service in 1906 in the engineering department of the Atlanta, Birmingham & Atlantic (now part of the Atlantic Coast Line). A graduate in engineering at Centre College, Mr. Morton served as assistant engineer of the Kansas City Southern at Texarkana, Tex., from 1909 to 1912. In the latter year he joined the Louisville & Nashville as assistant engineer in the chief engineer's office, which position he held until 1917. He entered military service during World War I, attaining the rank of lieutenant colonel. Upon his return to L. & N. service, he was made special engineer at Louisville, Ky., which position he held until 1928. At that time he was advanced to division superintendent at New Orleans, La., and in 1931, following a consolidation of divisions, he was transferred to Mobile, Ala., as superintendent of the Montgomery and New Orleans division. In the latter part of 1931 he was appointed assistant general manager, and in 1941 he was made also assistant vice-president, which positions he held until his current promotion.

Engineering

H. S. Purdom, assistant division engineer on the Chesapeake & Ohio, at Russell, Ky., has been appointed district engineer, to succeed **P. L. Graves,** assigned to other duties.

Fred E. Ladd, assistant division engineer on the St. Lawrence division of the New York Central, has retired after more than 35 years of service.

Fred G. Shaw, architect on the Texas & Pacific, with headquarters at Dallas, Tex., has retired.

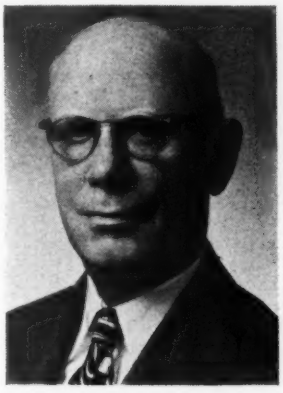
William F. Klee, assistant engineer in the engineering department of the Illinois Central, with headquarters at Chicago, has retired after 39 years of service.

C. K. Holden, division engineer on the Canadian Pacific, at Winnipeg, Man., has been transferred to the Kootenay division, with headquarters at Nelson, B.C. In the October issue it was erroneously reported that he had retired.

H. G. Whittet, Jr., assistant supervisor of track on the Chesapeake & Ohio, at Chillicothe, Ohio, has been appointed designer, with headquarters at Richmond, Va. Mr. Whittet has been succeeded at Chillicothe by **I. H. Weaver,** as reported in the October issue.

F. W. Campbell, assistant division engineer on the Canadian National, at Belleville, Ont., has been appointed division engineer, with the same headquarters. Mr. Campbell was born in Toronto, Ont., and entered the service of the Canadian National in May, 1926, as an instrumentman, at Capreol, Ont. Later he served as assistant engineer at Hornepayne, Ont., and at St. Thomas. Released from the armed forces of Canada, he resumed his railway career in January, 1945, as assistant division engineer at Belleville, the position he held at the time of his recent promotion.

W. H. Brameld, assistant to the chief engineer maintenance of way on the Erie, with headquarters at Cleveland, Ohio, has retired after 47 years of service. Mr. Brameld was born in England on October 22, 1881, and received his higher technical



W. H. Brameld

training at Cooper Union, New York. He entered railroad service in July, 1899, as a chainman on the Erie, and worked up through the various grades on surveys and construction until he became assistant engineer in charge of grade-crossing elimination. In 1916 he was appointed assistant to the chief engineer, and in 1920 he became engineering assistant to the operating vice-president. Mr. Brameld was appointed assistant to the chief engineer maintenance of way in 1928, and served in that capacity until the time of his retirement.

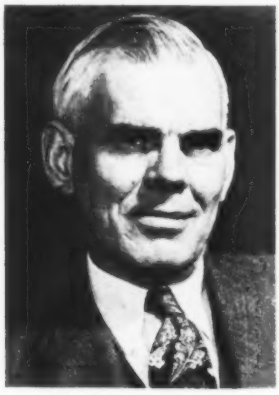
H. S. Deubelbeiss, assistant engineer in the office of the chief engineer of the Canadian Pacific, with headquarters at Montreal, Que., has retired. He was born at Zurich, Switzerland, in 1881, and entered the company's service on September 10, 1906, as a structural draftsman. In 1912 he was advanced to assistant engineer in the office of the chief engineer, the position he held at the time of his retirement.

G. N. C. Allen, whose appointment as division engineer on the Canadian National, with headquarters at Ottawa, Ont., was reported in the October issue, was born at Moncton, N.B., and entered the company's service in 1917 as a junior clerk. Subsequent to serving in various other positions, he was appointed assistant engineer in 1939. In 1944 he became assistant division engineer on the St. Lawrence division, with headquarters at Montreal, Que., the position he held at the time of his recent promotion.

H. J. Fast, whose appointment as division engineer on the Canadian National, with headquarters at Hornepayne, Ont., was reported in the September issue, was born at Puchora, Russia, on February 12, 1913, and was graduated by the University of Saskatchewan in 1940. After holding

various positions in mining, geological, and construction surveys at Timmins, Ont., he entered the service of the Canadian National in 1938 as continental representative at London, England, Prague, Czechoslovakia, and Warsaw, Poland. In 1940 he became resident engineer and geologist for Negus Mines, Ltd., at Yellowknife, N.W.T., Can. Mr. Fast re-entered the service of the Canadian National in 1941 as assistant engineer, at St. Thomas, Ont. In March, 1946, he was appointed assistant division engineer, at London, Ont., the position he held at the time of his recent promotion.

Arthur B. Fowler, whose promotion to superintendent of construction on the Erie, with headquarters at Cleveland, Ohio, was announced in the November issue, was born at Colton, Cal., on June 8, 1895, and received his higher education at the Kansas State Agricultural college. He entered railroad service during the summer of 1913 as a rodman on the Atchison, Topeka & Santa Fe, and served in that capacity and as a transitman until 1917, when he joined the Southern Pacific



Arthur B. Fowler

as transitman and draftsman. Released from the armed forces in 1919, he entered the service of the Erie as a transitman. In August, 1923, he was appointed resident engineer, and served in that capacity at Jersey City, N.J., and at Hornell, N.Y., until his recent promotion.

W. H. Rochester, assistant chief engineer on the Atchison, Topeka & Santa Fe, Coast Lines, at Los Angeles, Cal., has been appointed acting chief engineer of the road's Gulf Lines, with headquarters at Galveston, Tex., relieving **W. W. Wilson,** who has been granted a leave of absence. It was incorrectly reported in the November issue that Mr. Rochester had been appointed chief engineer and that Mr. Wilson had retired.

H. B. Hoyt, assistant division engineer on the Baltimore & Ohio, at East Salamanca, N.Y., has been appointed division engineer on the Buffalo division, with headquarters at Punxsutawney, Pa., where he succeeds **W. E. Kearfott,** whose recent death in that city is reported elsewhere in these columns.

Roy M. Rose, assistant office engineer on the Atchison, Topeka & Santa Fe, at Amarillo, Tex., has been appointed office engineer, with the same headquarters, succeeding **E. L. Mayne,** deceased. **Glen L. Mercer,** assistant engineer at Amarillo, has been appointed assistant office engineer, with the same headquarters, succeeding Mr. Rose.

J. C. Bussey, maintenance engineer, Cincinnati Union Terminal, Cincinnati, Ohio, has been appointed chief engineer of the Chicago, Indianapolis & Louisville, with headquarters at Lafayette, Ind. He succeeds **Anton Anderson,** who will remain with the road in an advisory capacity until his retirement on December 31.

J. C. Bussey

Mr. Bussey was born at Parksville, S.C., in 1900, and was graduated from Clemson College in 1922, with the B.S. degree in civil engineering. He entered railroad service with the Seaboard Air Line in 1922, and advanced through its engineering department at Norfolk, Va., to the position of chief draftsman. In 1928 he became assistant engineer of the Cincinnati Union Terminal, and since 1934 had been its maintenance engineer.

Track

M. Pashniak, section foreman on the Canadian Pacific, at Ernfold, Sask., has been appointed roadmaster, with headquarters at Assiniboia, Sask.

A. T. Darnell, roadmaster on the Atchison, Topeka & Santa Fe, with headquarters at Fort Worth, Tex., has retired.

E. L. Brand, roadmaster on the St. Louis-San Francisco, with headquarters at Poplar Bluff, Mo., has been transferred to Chaffee, Mo.

A. K. Rois, roadmaster on the Canadian Pacific, with headquarters at Swift Current, Sask., has retired.

H. W. Seeley, supervisor of track on the Erie & Ashtabula division of the Pennsylvania, at New Castle, Pa., has been transferred to Columbus, Ohio, to succeed **Stuart Shumate,** whose resignation to join another railroad was reported in the November issue. **C. A. Beemer,** assistant supervisor of track on the Maryland division, at Perryville, Md., has been promoted to supervisor of track at New Castle, replacing Mr. Seeley. **R. H. Smith,** assistant supervisor of track on the Conemaugh division, at Aspinwall, Pa., has been transferred to Perryville, succeeding Mr. Beemer, and **D. A. Sutherland,** assistant on the engineer corps, Eastern region, has been promoted to assistant supervisor of track at Aspinwall, to succeed Mr. Smith.

J. F. McCarthy, general foreman on the Erie, at Port Jervis, N.Y., has been promoted to track supervisor on the Buffalo and South Western division, with headquarters at Jamestown, N.Y.

Allan G. Hunter, assistant supervisor of track on the Richmond, Fredericksburg & Potomac, has been promoted to supervisor of track, District No. 1, with headquarters at Richmond, Va., succeeding **H. A. Wright,** deceased.

R. W. Barrett has been appointed supervisor of track on the New York Central, with headquarters at Franklin, Pa., where he replaces **F. J. Marino,** who has retired after 46 years of railroad service.

J. Contini, roadmaster on the Canadian Pacific, at Rosetown, Sask., has been transferred to Shaunavon, Sask., where he succeeds **G. Kostiuk,** who has been transferred to Rosetown, to replace Mr. Contini.

R. L. Williams, assistant supervisor of track on the Illinois Central, at Waterloo, Iowa, has been promoted to supervisor of track at Freeport, Ill., where he succeeds **J. J. Desmond,** who has retired.

Albert F. Trautman, assistant roadmaster on the Chicago & North Western at Worthington, Minn., has been promoted to roadmaster at Spooner, Wis., replacing **J. W. Hendrickson,** who has been transferred to St. Paul, Minn., where he succeeds **A. M. Hendrickson,** who has retired after 53 years of service. **G. H. Clark** has been appointed assistant roadmaster at Worthington, succeeding Mr. Trautman.

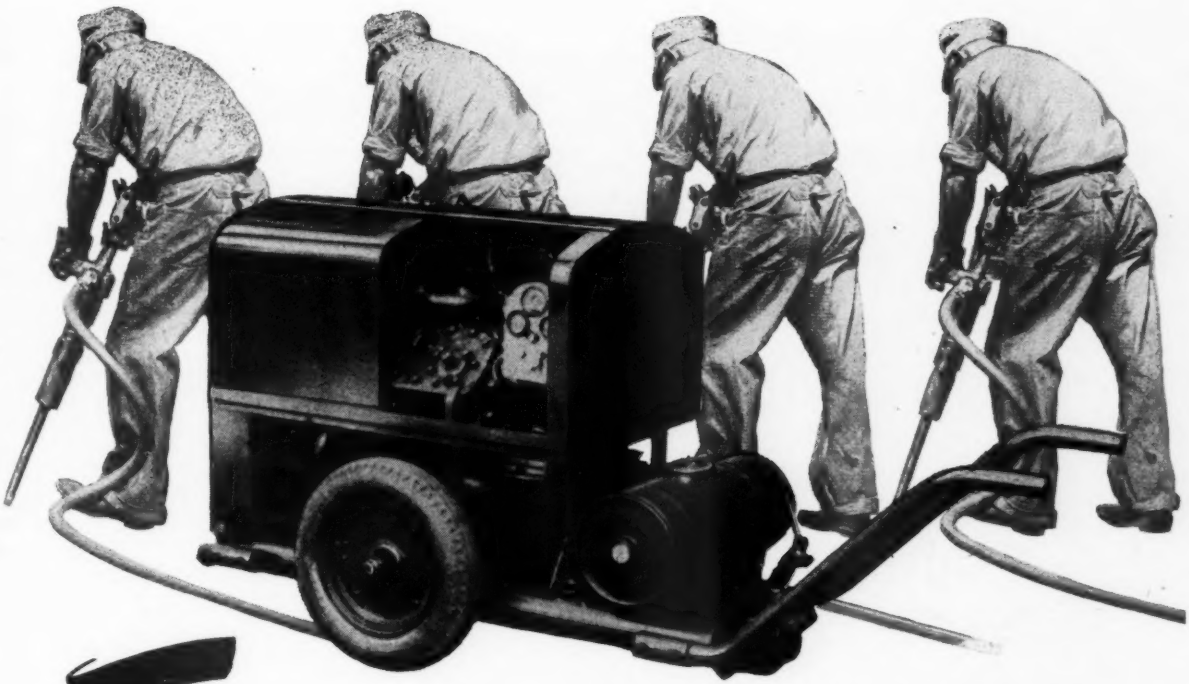
C. Kelly, roadmaster on the Atchison, Topeka & Santa Fe, with headquarters at Arkansas City, Kan., has retired after more than 45 years of service. **Harry W. Green,** roadmaster at Chanute, Kan., has been transferred to Arkansas City. **P. Scogin,** track supervisor at Moline, Kan., has been appointed roadmaster at Chanute, where he replaces Mr. Green. **C. I. Thompson** has been appointed track supervisor at Moline, to succeed Mr. Scogin.

H. L. Woolwine, assistant roadmaster on the Norfolk & Western, with headquarters at Crewe, Va., has been promoted to roadmaster with headquarters at Eckman, W. Va., where he succeeds **H. M. Smith,** who has retired. **B. H. Lester,** inspector in the office of the manager of roadway maintenance, succeeds Mr. Woolwine, as reported in the November issue. **John F. Anglin,** a section foreman on the Scioto division, has been appointed assistant roadmaster at Portsmouth, Ohio. **William Smith,** assistant roadmaster at Radford, Va., has retired.

Bridge and Building

John A. Campbell, a bridge and building apprentice on the Central region of the Pennsylvania, has been promoted to assistant master carpenter on the New York division, with headquarters at Jersey City, N.J., succeeding **J. R. Maxwell,**

(*Continued on page* 1322)



Tampair a great little compressor for small crews

Much can be said in favor of using several small compressors instead of fewer big ones. Flexibility, for instance. You can spot-tamp over a wide area with one Schramm Tampair and four Schramm tampers per gang. Then for bigger jobs just combine your gangs.

Schramm Tampair is handy. Tow it on a push car for speedy moving to the job. On the job, it is easily shifted, either off track on its balloon-tired wheels or pushed along the rail on its double flanged dolly wheels.

You will be seeing more and more Schramm Tampairs, for maintenance men are going for them in a big way. Of course we make big fellows, too, in practically any capacity and mounting you can name. Let us send you the big attractive Schramm catalog which tells all about them.

Salient Features of the Tampair

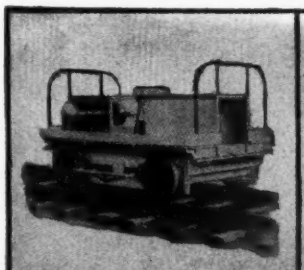
COMPACTNESS — actual dimensions of both motor and compressor only 34 x 34 x 24 inches.

SIMPLICITY — Unit construction; both motor and compressor in same block, both liquid cooled. Same system lubricates both.

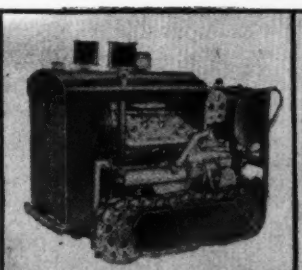
BALANCE — Two compressor, two motor cylinders on each side of the Ford-Mercury V-8 block.

EASE OF MAINTENANCE — Ninety per cent of the Fordair's parts are quickly available from your local Ford-Mercury dealer.

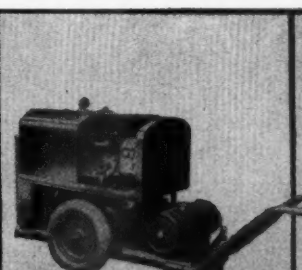
SCHRAMM INC. THE COMPRESSOR PEOPLE WEST CHESTER PENNSYLVANIA



Fordair Model 60 Railcar



Fordair Model 60 Crawler



Fordair Model 60 Tampair

Fordair Model 60 Standard Two-wheel Trailer

(*Continued from page* 1320)

resigned. **J. W. N. Mays,** a bridge and building apprentice on the Maryland division, has been promoted to assistant master carpenter on the Panhandle division, succeeding **C. G. Hill,** resigned.

Noel Dixon, assistant engineer on the St. Lawrence division of the Canadian National, at Montreal, Que., has been appointed bridge and building master on the same division and with the same headquarters, succeeding **T. H. Harrington,** who has retired. Mr. Dixon was born in England on July 10, 1898, and entered railroad service in 1927 as a chainman on the Canadian Pacific. Subsequent to serving in other positions on that railroad and with the Ontario Department of Highways, the Ontario Hydro-Electric Commission, H. F. MacLean, and the Foundation Company of Canada, Ltd., he entered the service of the Canadian National on January 1, 1944, as an instrumentman. In August, 1944, he was appointed assistant engineer at Montreal, the position he held at the time of his recent promotion.

Obituary

Samuel P. Davidson, who retired in 1944 as roadmaster and supervisor of bridges and buildings on the Norfolk & Western, with headquarters at Norfolk, Va., died recently.

Louis Yager, assistant chief engineer of the Northern Pacific, with headquarters at St. Paul, Minn., died on November 22 at the Northern Pacific Hospital, St. Paul. He was 69 years old and had served with the Northern Pacific for 46 years.

William E. Baker, who retired in March as supervisor of track on the Pennsylvania, died at Cleveland, Ohio, on September 6.

P. J. Watson, Jr., president of the Terminal Railroad Association of St. Louis (Mo.), and an engineer by training and experience, died suddenly on November 1, in a hospital in Kansas City, Mo., following an emergency operation.

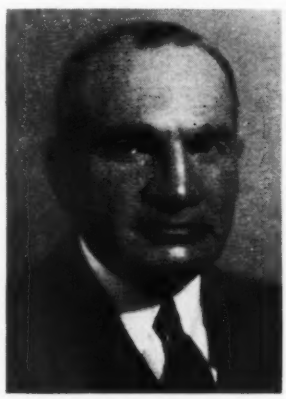
James A. Nichols, superintendent of the Indiana division of the New York Central, with headquarters at Indianapolis, Ind., and engineer by training and experience, died in that city on October 30.

Alonzo Stewart, who retired in February, 1945, as roadmaster on the Atchison, Topeka & Santa Fe, with headquarters at Albuquerque, N.M., died in that city on October 9.

William E. Kearfott, division engineer on the Baltimore & Ohio, with headquarters at Punxsutawney, Pa., died recently in that city. Mr. Kearfott was born on December 25, 1893, at Kearneysville, W. Va., and received his higher technical training at Virginia Polytechnic Institute. Entering railroad service in June, 1915, as a rodman on the Virginia, he joined the Baltimore & Ohio in November of the same year, and served as transitman, district bridge inspector, master carpenter, and assistant division engineer until 1936, when he was appointed assistant engineer, maintenance of way and structures, at Pittsburgh, Pa. In 1942 Mr. Kearfott was appointed division engineer at Connellsville, Pa., whence, in May, 1944, he was transferred to Akron, Ohio. In August, 1946, he was transferred to Punxsutawney, the position he held at the time of his death.

John J. Pelley, president of the Association of American Railroads since its inception in 1934, and former roadmaster on the Illinois Central, died in Washington, D.C., on November 12, at the age of 68.

Mr. Pelly was born at Anna, Ill., on May 1, 1878. He attended the University of Illinois and began his railway service as a station clerk for the Illinois Central at Anna in 1899, continuing with that road for more than 20 years. He served successively as a track apprentice, assistant foreman of an extra gang, foreman, general foreman and supervisor. In 1906 Mr.



John J. Pelley

Pelley became assistant roadmaster on the Memphis division. His promotion to roadmaster came in 1908 which position he held at various points. Subsequently he was appointed superintendent at Fulton, Ky., which position he held until 1915, when he was transferred to Memphis, Tenn. In 1917 he was further promoted to general superintendent of the Southern lines of the Illinois Central, with headquarters at New Orleans, La., and in 1919 he was transferred to the Northern lines.

Mr. Pelley withdrew temporarily from the service of the Illinois Central in 1920 to engage in work for the Car Service division of the American Railway Association at Chicago. In this connection he was appointed chairman of the Chicago Car Service committee and manager of the Refrigerator Car section of the Car Service division, in which capacity he served until April 1, 1923. On this latter date he returned to the service of the Illinois Central as general manager, a position which he held until November, 1924, when he became vice-president in charge of operation. On September 15, 1926, he was elected president of the Central of Georgia and in February, 1929, president of the New York, New Haven & Hartford.

In September, 1934, he resigned as president of the New Haven and was elected to the presidency of the Association of American Railroads, the position he held at the time of his death.

Association News

Roadmasters' Association

Under the direction of President E. J. Brown, the Executive committee of the association will meet in Chicago on December 9, at 9:30 a.m., at the Chicago Engineers' Club. The principal business of the meeting will be the selection of the technical committees to undertake studies and report at the 1947 convention.

Bridge and Building Association

The Executive committee of the association, on a call by President F. G. Campbell, will meet on December 10, in Chicago, at the Chicago Engineers' Club, at 9:15 a.m. This meeting is primarily to select the personnel of the technical committees of the association for the ensuing year.

Track Supply Association; B. & B. Supply Men's Association

At a joint meeting of the boards of direction of the Track Supply Association and the Bridge & Building Supply Men's Association in Chicago, November 25, plans were adopted for a joint exhibit next September in conjunction with the concurrent annual meetings of the Roadmasters' Association and the Bridge and Building Association, September 16-18, at the Hotel Stevens, Chicago. The boards also voted to tender again to the members of both railway associations a joint banquet during their conventions.

Metropolitan Maintenance of Way Club

At the next meeting of the club, which will be a luncheon meeting in the Skyline room of the Hotel Sheraton, New York, on December 12, the principal speaker will be T. A. Blair, assistant chief engineer, Atchison, Topeka & Santa Fe, who will address the club on Roadbed Grouting. In accordance with a custom of previous years, this meeting is scheduled to be held on the same day as the annual dinner of the New York Railroad Club.

Sixty-nine members and guests attended the last meeting of the club, which was held at the Hotel Sheraton on October 24. The speaker at this meeting was H. F. Fifield, engineer maintenance of way, Boston & Maine, whose topic was Maintenance Problems on the Boston & Maine.

Maintenance of Way Club of Chicago

Anderson Pace, general industrial agent, Illinois Central, was the speaker at the meeting of the club held on November 25. Following dinner at 6:30 p.m., which was attended by 111 members and guests, Mr. Pace discussed present trends in the field of industrial development; how they are affecting the mid-continent area; what can be expected along industrial lines in the next few years; and how this will affect the earnings of the railways.

The next meeting of the club will be held at a new place to be selected, on December

(*Continued on page* 1324)


Merry Christmas
THE IMPROVED FAIR ANCHOR

(*Continued from page* 1322)

16, and will be addressed by Daniel P. Loomis, executive director, Association of Western Railways, on The History and Results of Railway Labor Legislation. The program will also include the showing of two unusually good motion pictures of track renewal and maintenance methods on the London, Midland & Scottish, England.

Wood Preservers' Association

Following is a list of the technical committee chairmen of the association for the ensuing year, completed at the meeting of the Executive committee in Minneapolis, Minn., October 18: Preservatives, R. H. Baechler; Oak Ties and Lumber, and Piles, Pressure Treatment, P. D. Brentlinger; Southern Pine Ties and Lumber, Pressure Treatment, E. H. Moore; Gum Ties and Lumber, Pressure Treatment, J. A. Vaughan; Poles, Pressure Treatment, G. Q. Lumsden; Poles, Non-Pressure Treatment, J. P. Wentling; Intermountain Douglas Fir and Western Hemlock, Pressure Treatment, Paul Wayman; Miscellaneous Species, Ties and Lumber, Poles and Piles, Pressure Treatment, J. D. MacLean; Wood Blocks, N. E. Kittell; Inspection, H. F. Round; Handling of Forest Products, A. E. Larkin; Tie Service Records, W. R. Goodwin; Bridge and Structural Timber, T. H. Strate; Marine Pile Service Records, A. S. Daniels; Pole Service Records, C. H. Amadon; Post Service Records, J. O. Blew; Diversified Uses of Treated Wood, Leonard Perez; Uses of Treated Wood for Car Lumber, H. R. Condon; Pressure Treated Foundation Piles, W. A. Stacey; Fireproofing, R. H. Mann; and Special Committee on Preservative and Fire Retardant Treatment of Laminated Members (Plywood and Glued-up Fabrication), D. L. Lindsley.

American Railway Engineering Association

As a result of the resignation of C. J. Geyer, senior vice-president of the association, and general manager of the Chesapeake & Ohio, effective immediately, Armstrong Chinn, junior vice-president of the association, and chief executive officer, Alton, has been automatically advanced to senior vice-president. At a meeting of the Board of Direction held at Chicago on November 19, C. H. Mottier, a member of the board, and vice-president and chief engineer of the Illinois Central, was elected junior vice-president to succeed Mr. Chinn.

A meeting of the Nominating committee was held at Chicago on November 19, and the Committee on Outline of Work of the Board of Direction met on November 20. At this meeting tentative conclusions regarding the committee assignments for the ensuing year were reached, and the chairmen of committees have been notified of the results. A meeting of the Committee on Personnel of the board was held on November 25 to consider recommendations of the chairmen of the various standing committees regarding changes in personnel, and also to give consideration to possible changes among the chairmen and vice-chairmen of committees.

Three standing committees held meetings during November, including the Committee on Wood Bridges and Trestles, which met at Chicago on November 5, the Committee on Co-operative Relations with Universities, which met at Chicago on November 20, and the Committee on Records and Accounts, which met at Cincinnati, Ohio, on November 21 and 22.

Two committees have scheduled meetings for December. The Committee on Impact and Bridge Stresses will met at Chicago on December 3, and the Committee on Track will meet at the same place on December 5.

National Railway Appliances Association

At a meeting of the board of directors on November 8, preliminary plans were made for the thirty-second annual exhibition of the association, to be held in the Coliseum, Chicago, March 17-20, 1947, in connection with the annual meeting of the American Railway Engineering Association. Floor plans, space contracts and other printed data will be mailed to members early in December, but other companies desiring exhibit space should contact the secretary of the association, C. H. White, 208 So. La Salle St., Chicago 4.

Supply Trade News

General

The **Overly Manufacturing Company,** Greensburg, Pa., has announced the acquisition of the **McAleenan Brothers Company,** Pittsburgh, Pa. **George R. McAleenan** will continue as president of the company.

The **Davey Compressor Company** has appointed the **Claude B. Smith Company,** 615 Sansome street, San Francisco, Calif., as northern California distributors for Davey compressors.

The eastern sales office of **R. G. LeTourneau, Inc.,** under the management of **O. A. Williams,** is now at 412-413 Defense building, 1026 Seventeenth Street, N.W., Washington, D.C.

The **U-C Lite Manufacturing Company** has announced the removal of its general offices and factory to new and larger quarters at 1050 West Hubbard street, Chicago 22.

The **Davey Compressor Company** has announced the appointment of the **Contractors Machinery Company,** Kansas City, Mo., as a distributor of Davey compressors.

Personal

O. W. Irwin, manager of concrete bar sales of the **Carnegie-Illinois Steel Corporation,** has retired. The specialty products division, of which **G. T. Siebert, Jr.,** is sales manager, has been made responsible for the distribution of concrete bars.

William K. Greene, engineer in the designing department of the **American Bridge Company** (a subsidiary of the United States Steel Corporation), with headquarters at New York, has been appointed assistant division engineer of the Chicago district, with headquarters at Chicago, succeeding **T. A. Jordan,** who has retired after 36 years of service with this company.

William S. Boyce has been appointed manager, railroad sales, of the **Colorado Fuel & Iron Corp.,** with headquarters at Denver, Colo.

Arthur E. Jacobs has been appointed vice-president and sales manager of the **Blackmer Pump Company,** Grand Rapids, Mich.

K. V. Turner has been appointed assistant sales manager of the **LaPlant-Choate Manufacturing Company,** Cedar Rapids, Iowa.

J. T. Myers, assistant general manager of the **Davey Compressor Company,** Kent, Ohio, has been elected vice-president in charge of sales and production.

Albert A. Mattson has been appointed supervisor of traffic for the **Koppers Company,** and **James F. Haley** has been named supervisor of transportation, both with headquarters in Pittsburgh, Pa.

John R. Newkirk, former chief engineer in charge of production engineering, research and development, has been elected vice-president in charge of all plant operations of the **National Pneumatic Company,** Rahway, N.J.

Robert M. Hayes, treasurer of the **Oliver Iron & Steel Corporation,** has been appointed secretary of the company. **W. F. Roll,** assistant treasurer, will serve, in addition, as assistant secretary.

Charles F. Codrington has been appointed sales manager of the blower and compressor department of the **Allis-Chalmers Manufacturing Company,** Milwaukee, Wis., succeeding **A. E. Caudle,** who has resigned.

Dr. J. B. Austin, assistant director, has been appointed director of the research laboratory of the **United States Steel Corporation of Delaware,** at Kearny, N. J., succeeding **Dr. John Johnston,** who has retired.

Gilmore Hiett has been appointed advertising and sales promotion manager of the **Gorman-Rupp Company,** Mansfield, Ohio. He was previously advertising manager, refrigerators and home freezers, for the Westinghouse Electric Corporation.

M. A. Clements, Central Division service manager of the **Caterpillar Tractor Company,** has been appointed service manager of the Western Division, with headquarters at San Leandro, Cal., succeeding **R. E. Mayo,** who has taken charge of the field research office at San Leandro. **J. D. Uhll,** service engineer, succeeds Mr. Clements as service manager for the Central Division. **E. M. Iverson** succeeds Mr. Uhll as service engineer for the Central Division.

Arthur G. Hall has been appointed works manager of the **Nordberg Manufacturing Company,** Milwaukee, Wis. Mr. Hall comes to Nordberg from the Koppers Company. Following his graduation from the Massachusetts Institute of Technology in 1925 with a B.S. degree in mechani-

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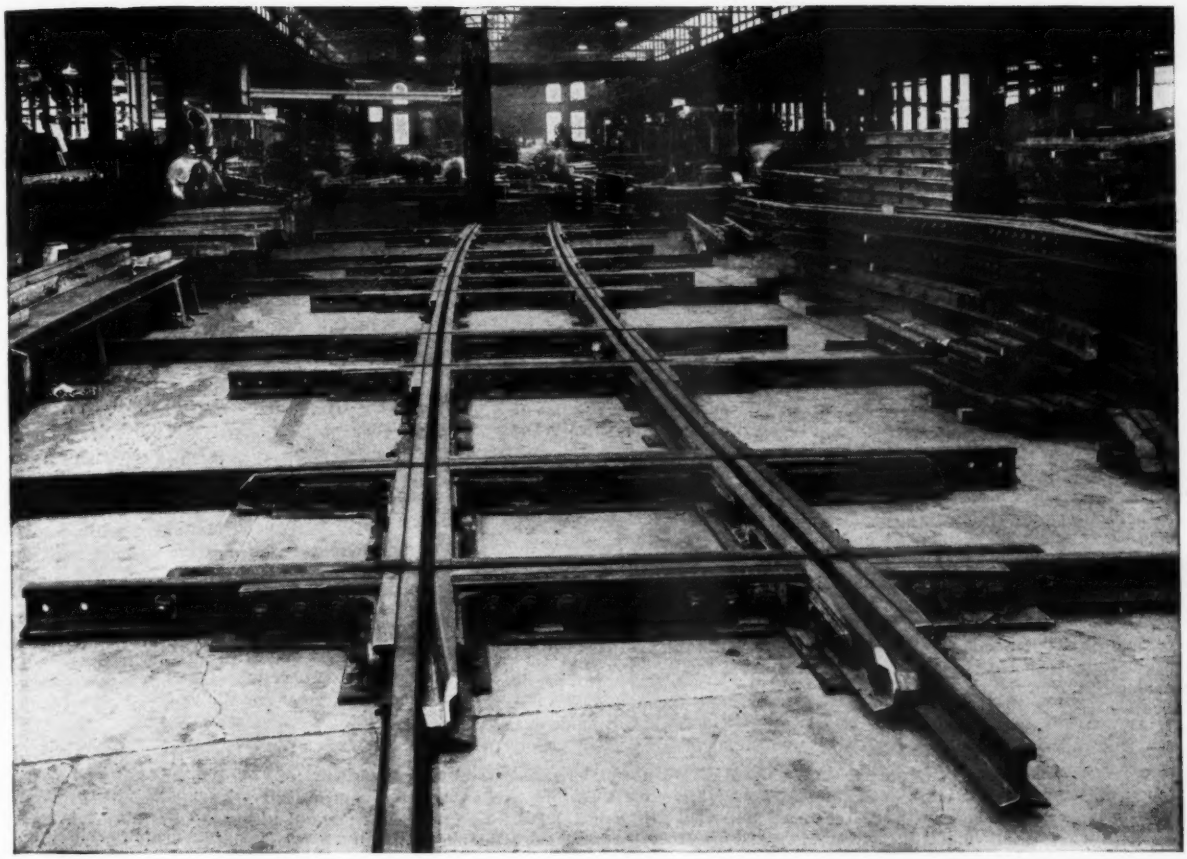

A layout of five Heat-Treated Crossings for Jacksonville Terminal Company, awaiting final inspection in the Weir Kilby Cincinnati Plant

● ● ● ● Material of such rugged construction and precise design is required by the railroads to maintain their heavy and fast freight and passenger schedules.

During 1945 the railroads of the United States spent more than one and one-half billion dollars for material and equipment, a necessary expenditure to maintain this vital element of the national economy.

Positive action must be taken to assure the railroads a fair revenue so that they in turn can continue to render their essential service to the nation.

Standard and Special Track Work for Steam Railroads Since 1882

WEIR KILBY CORPORATION

CINCINNATI 12, OHIO — BIRMINGHAM 7, ALA.

Successors to

WEIR FROG CO. . . . KILBY FROG & SWITCH CO. . . . CINCINNATI FROG & SWITCH CO.

(*Continued from page* 1324)

cal engineering, he joined the Bartlett Hayward Company, and was engaged in various engineering capacities which led to the position of works manager of the Western Gas Division of the Koppers Company at Fort Wayne, Ind. He later returned to the Bartlett Hayward division of Koppers, and during the war he was in charge of its plants at Baltimore, Md.

George P. Torrence, executive vice-president of the **Link-Belt Company,** Chicago, has been elected president of the firm to succeed **William C. Carter,** who continues as a director of the company and chairman of its board of directors' executive committee.

Mr. Carter was born near Homer, Ill., on October 10, 1881, and received his higher education at the University of Illinois, where he was graduated in 1902 with a B.S. degree in mechanical engineering. Shortly afterwards he became a machinist's helper for the Commonwealth Edison Company, and in August, 1902, he accepted a position as draftsman in the Link-Belt's Pershing Road plant at Chicago. He held successively the positions of engineering department supervisor, construction superintendent, plant superintendent, plant general manager, vice-president in charge of production, and executive vice-president. He was elected president in December, 1942.

Mr. Torrence was graduated from Purdue university in 1908, with a degree in mechanical engineering. He joined the firm in 1911 as a draftsman at Indianapolis, Ind. During his service with the company he has held various positions, which included manager of the Indianapolis operations from 1926 to 1932, and president of these operations from the latter date until 1936. In addition to his experience with the Link-Belt Company, Mr.

George P. Torrence

Torrence was general manager of Rayon Machinery Corporation, a subsidiary of Industrial Rayon Corporation, from 1936 to 1944. He was also president of the Cleveland Pneumatic Tool Company from 1944 to 1946. He was made executive vice-president of Link-Belt on July 1, 1946.

W. B. Worden, district sales and service representative for **R. G. LeTourneau, Inc.,** in southern California and Arizona, has been appointed central sales manager, succeeding **M. E. Miller,** who has resigned to become sales manager for the Rozier-Ryan Company, LeTourneau distributor at St. Louis, Mo. In his new capacity Mr. Worden will supervise the activities of LeTourneau district representatives in approximately twenty mid-western states. **Harold F. Stenstrom** has been appointed district sales representative, with headquarters at Memphis, Tenn. **Henry Cain** has been appointed assistant to the eastern sales manager, with headquarters at Washington, D. C.

The American Manganese Steel division of the **American Brake Shoe Company,** Chicago Heights, Ill., has announced the following appointments: **A. R. Sittig,** manager of manganese steel sales, and **E. L. Quinn,** assistant vice-president in charge of welding products, both with headquarters in Chicago Heights, and **E. J. Nist,** assistant vice-president, with headquarters in New York.

Dr. Warren L. McCabe, head of the department of chemical engineering at Carnegie Institute of Technology, Pittsburgh, Pa., will become director of research for **The Flintkote Company,** succeeding **Dr. John J. Stanko,** who has been serving as acting head of Flintkote's research department, and who will serve as technical director for the company's operations on the Pacific coast.

Russell P. Proffitt, Chicago divisional manager of the **Timken Roller Bearing Company,** has been appointed district manager, with headquarters in Washing-

(*Continued on page* 1328)

(*Continued from page* 1326)

ton, D.C. **H. B. Lilley,** development engineer on alloy mechanical tubing, has been appointed district manager of the steel and tube division, with headquarters in Houston, Tex.

B. T. Eagerton has been appointed export manager of the **Nordberg Manufacturing Company,** with headquarters at its main office at Milwaukee, Wis.

Mr. Eagerton, who has worked in the exporting field since 1928, came to Nordberg from the Oliver Corporation, where

B. T. Eagerton

he served as assistant manager of the export division. He was previously export manager for the Cleveland Tractor Company, which was later absorbed by the Oliver Corporation.

John S. Hutchins, president of the Ramapo Ajax division of the **American Brake Shoe Company, William T. Kelly, Jr.,** president of the engineered castings division and the Kellogg division,

John S. Hutchins

Thomas W. Pettus, president of the national bearing division, and **Joseph B. Terbell,** executive vice-president of the American manganese steel division, have been elected vice-presidents of the parent organization.

Mr. Hutchins, a native of Arlington, Mass., has been with American Brake Shoe for 21 years, working mainly in a sales capacity. He was elected a vice-president of the Ramapo Ajax division

(*Continued on page* 1330)

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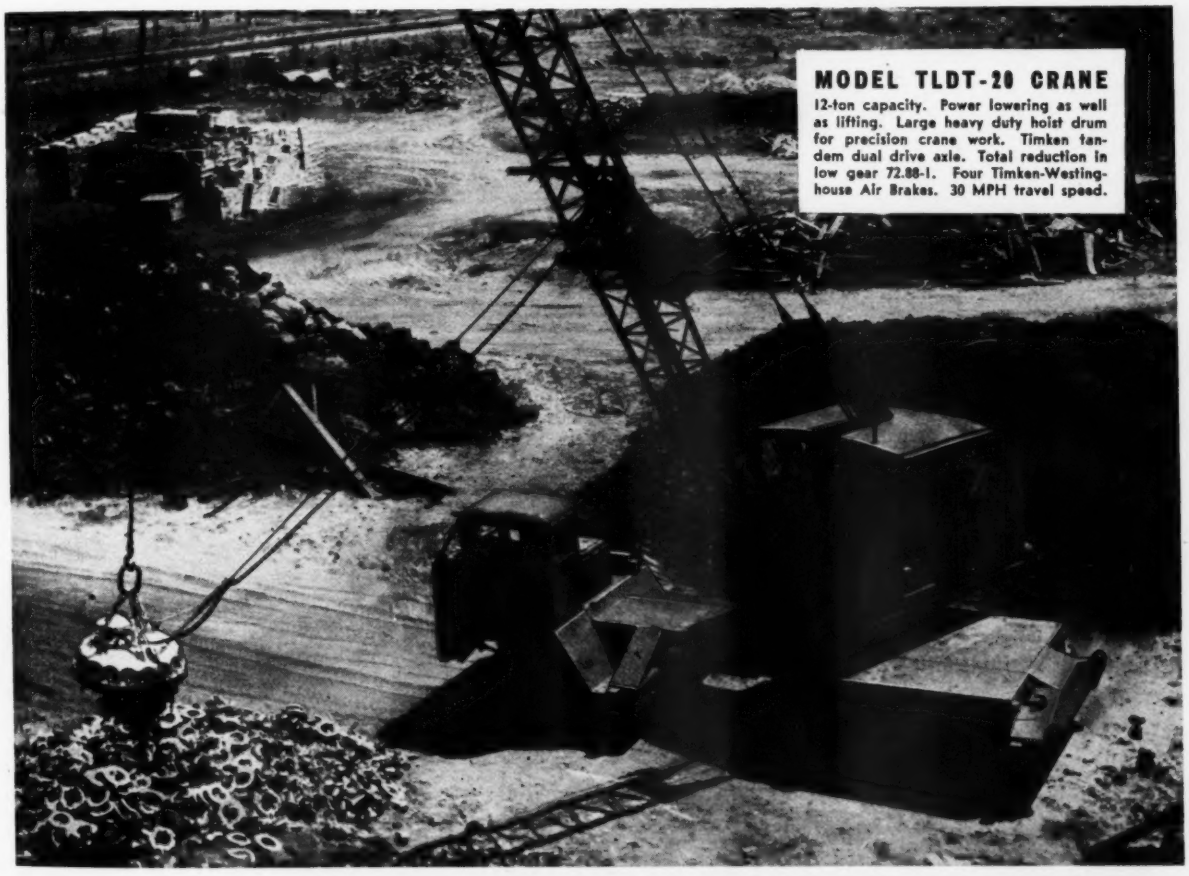

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MICHIGAN
POWER SHOVEL COMPANY
BENTON HARBOR, MICHIGAN

(*Continued from page* 1328)

in January, 1944, and president in September, 1945. Since December, 1945, he also has been chairman of the Canadian Ramapo Iron Works, Ltd.

David M. Lehti, vice-president of the **Link-Belt Speeder Corporation,** has been elected president, effective January 1, 1947, to succeed **Troy M. Deal,** who retires on March 1, 1947. Mr. Lehti first became associated with the company as a distributor in 1925. He joined the Speeder Machinery Corporation as a district representative

David M. Lehti

in 1934, and after a few months was made chief engineer of the plant at Cedar Rapids, Iowa. In 1939, upon consolidation of the Speeder Machinery Corporation and the shovel and crane division of the Link-Belt Company, he was promoted to assistant general manager of the newly formed Link-Belt Speeder Corporation at Cedar Rapids. He was elected vice-president in 1942.

Mr. Deal became associated with the Speeder Machinery Corporation in 1922. He was sales manager from the beginning. In 1933 he became president and general manager. In 1939 he became president of the Link-Belt Speeder Corporation.

Frederic E. Lyford, assistant to chairman of the board of **Merritt-Chapman & Scott Corp.,** has been elected president of that concern, effective November 27.

Elmer Anderson, service engineer of the **Timken Roller Bearing Company,** at Milwaukee, Wis., has been appointed assistant service manager of that company at Canton, Ohio.

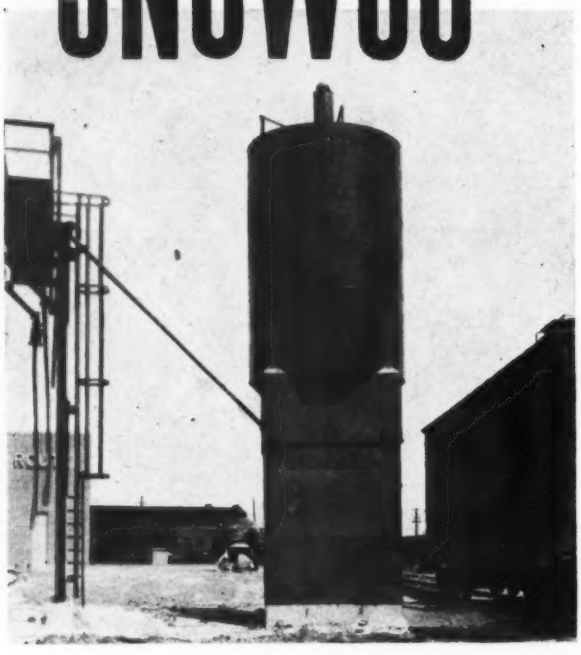
Robert M. Hayes has been elected treasurer of the **Oliver Iron & Steel Corp.** He has been with the company since 1944 in the position of treasurer. **W. F. Roll,** who has been assistant treasurer, will serve also as assistant secretary.

Obituary

R. E. Post, manager of the Washington, D. C., office of Fairbanks, Morse & Co., died in a Washington hospital on November 13.

C. D. Young, sales manager, Welding Division, Metal & Thermit Corporation, New York, died on November 16, at the Orange Memorial hospital, Orange, N.J.

SNOWCO *means* PROGRESS IN SAND STORAGE



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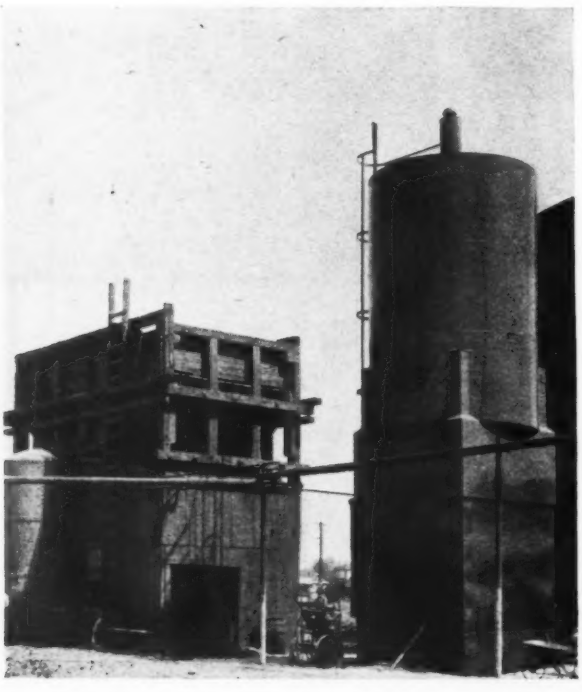

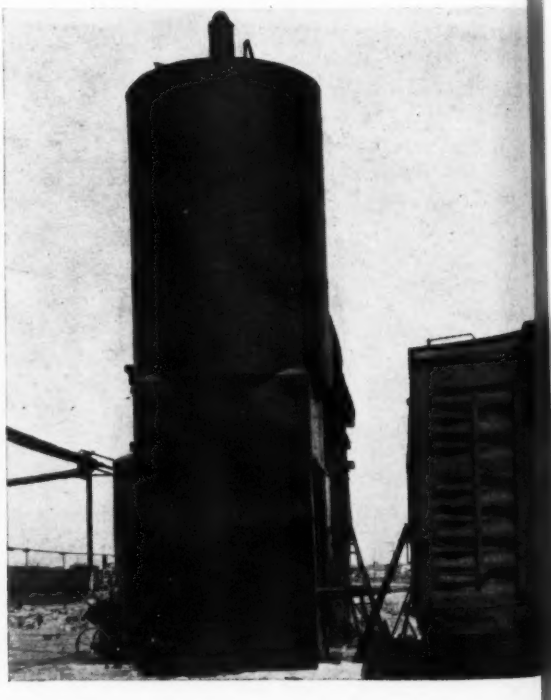

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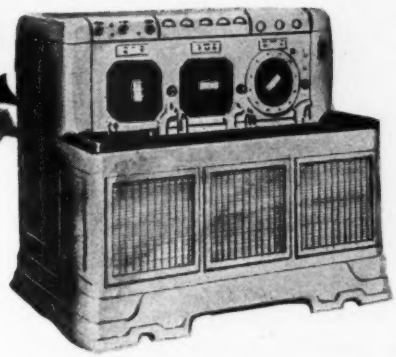

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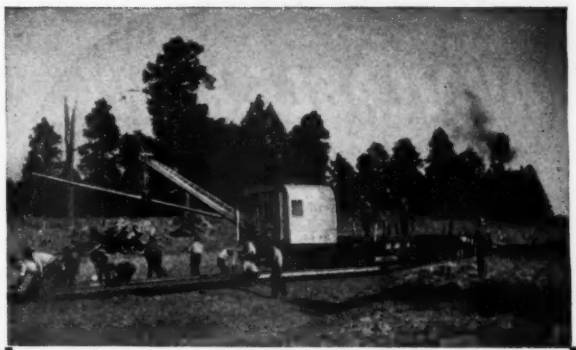

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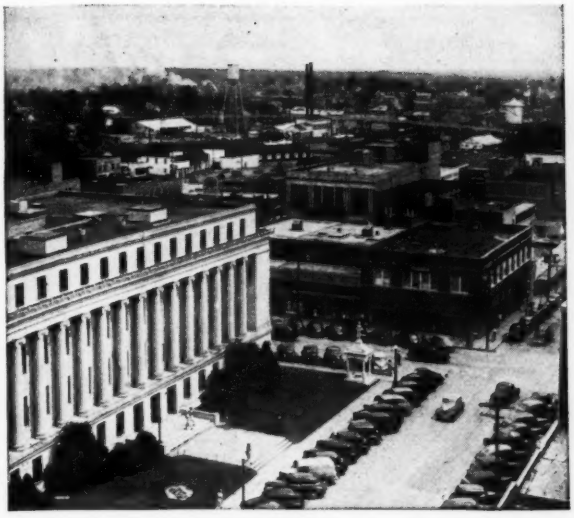

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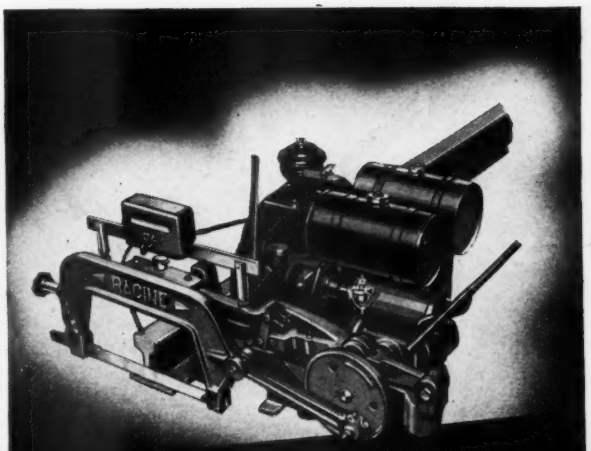

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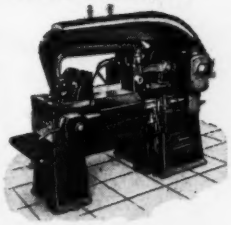

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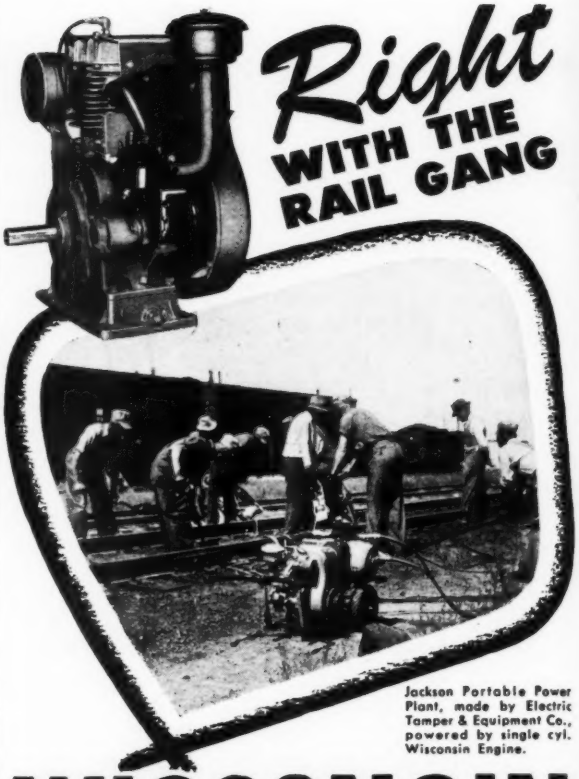

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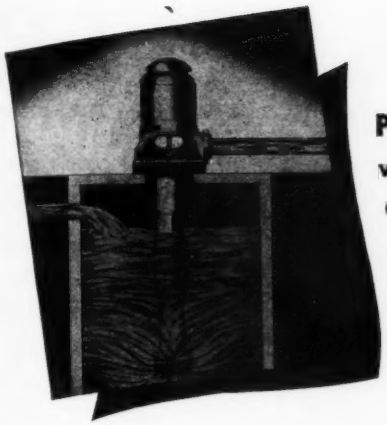

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